

# Editorial

## Quality assurance in the day surgery setting

The fundamental concept underlying modern ambulatory surgery is that the care delivered to the day case patient should be of a high quality. It could be argued that in many ways the level of care should surpass even that delivered in the inpatient setting as any minor morbidity may assume greater importance once the patient returns home. Nowadays healthcare professionals are aware that quality of care ought to be assured or guaranteed. The fact that the practice of quality assurance is only slowly being adopted in British hospitals is largely due to the problems that accompany this necessary activity.

Future health systems will be concerned with quality service and cost-effectiveness. Information on what is being done, to whom, by whom and using what resources, will become important. It is envisaged that the new breed of managers will assume control of many aspects of clinical practice. These people deal in hard facts and figures, and the everyday jargon will be of performance indicators, monthly costings, and outcome measures. Modern day surgery units will require access to such information, thereby allowing them to plan accordingly for the future and to utilize their resources efficiently. Such information could assume greater importance to many units; after all it could secure their continued existence and prevent closure. In the past doctors and nurses have been rightly accused of 'shroud waving' in order to obtain funding for their various activities. In future this behaviour will be reduced as resources will only be allocated if a proven need exists. Briefly, audit could play an important role in any hospital environment by providing just such proof.

One exciting benefit to be gained from quality assurance will be the improvement in health care provision. Jacyna<sup>1</sup> has stated that an inferior level of care may be implied by the assurance of quality and the implementation of improvement. This is not necessarily so, as the reasons for failing to meet required standards of clinical practice are many and varied. Far too often in current quality assurance, the appropriate standards are as yet unknown. Although research may indicate an improved method of practice, this takes time to become standard practice. Audit of the progressive improvement in the standard of care that follows the implementation of research could prove an enlightening exercise.

Why has the implementation of quality assurance been so slow? Two major problems exist. First, problems surrounding methods of data collection remain to be solved. Although computers are neither necessary nor mandatory, they do offer considerable advantages for audit. For instance, vast amounts of information may be processed with accuracy, but the data has either to be loaded into the system by hand or collected in such a way as to enable optical mark reading. Another solution is to enter the data 'on line', i.e. directly, using hand-held personal computers. The latter could be the way of the future but at the time of writing is far from widespread practice.

The second problem associated with quality assurance is deciding what actually constitutes an indicator of quality. Some indicators are self evident, others are less so. Admission rates have always been considered a measure of good day surgical practice: only recently have re-admission rates assumed greater importance, and few units regularly monitor the late starting and finishing of lists, or the wastage of commonly used anaesthetic drugs. We believe the development of quality indicators for day surgery will be an ongoing process. It is conceded that the indicators used in some publications are open to discussion, but quality indicators which will measure how near or how far any individual day unit is from the prescribed targets will be demanded by future managers, general practitioners, and indeed, patients alike.

Quality assurance should not be confused with research or reviews. Research is the means whereby the ideal standards of practice are determined, whereas quality

assurance is the measurement of the gap between those standards and current practice. Undoubtedly research and quality assurance ought to go hand in hand but the third member of this trio, education, should also be considered. Education is the means by which the standards set by research and maintained by quality assurance are communicated to the next generation of clinical staff. As already stated, quality assurance also has another purpose, namely the highlighting of areas where change may be appropriate. Each subsequent cycle of the audit loop should in theory bring a continued improvement in patient care, just as each generation of health practitioners have their own contribution to make. If we are truly committed to the provision of excellent health care in the field of day surgery, then quality assurance should hold no terrors for any of us. However we do have a duty to ensure that the quality assurance programmes we embark upon are meaningful, and fulfil their designated purpose. Finally we believe that all members of a day surgery unit should be involved in audit activities and the papers appearing in this edition will outline some of the benefits and pitfalls which may arise if an active clinical audit programme is instituted. There are tremendous benefits to be gained for all concerned.

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# A quality assurance initiative in day case surgery: general considerations

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With the increasing demand for audit in the day surgery setting, a quality assurance initiative was implemented in a busy British day surgery unit. This paper outlines how such a programme was designed and established. The indicators of quality in day surgery and the standards of practice used are discussed. The results of the data collected are discussed and the recommendations for improvement are outlined. Hopefully this paper will serve as a concrete and practical guide for the implementation of a quality assurance programme in other day surgery facilities.

Key words: Quality assurance audit, day surgery

## Introduction

The scope of day surgery is expanding, not only in terms of the number of operations performed each year, but also in terms of the range of procedures undertaken on a day case basis. The foundation upon which day surgery is based is the concept of high quality care. It is unacceptable that a large number of patients can be treated efficiently, and cost-effectively, if the quality of that service does not match or surpass that of more formal inpatient care.

With the publication in the UK of the recent National Health Service (NHS) Management Executive Task Force Report<sup>1</sup> highlighting the proposed growth of day surgery to include 50% of all elective operations by the year 2000, the issue of quality assurance has now assumed relevance in the day surgery setting.

A quality assurance initiative was commenced at the Addenbrooke's Day Surgery Unit (DSU) in June 1993, with the aim of defining quality assurance indicators, setting the relevant standards, and refining the process of data collection and analysis to make such a programme practical in a busy day unit. The results of this initiative should therefore represent a 'snap-shot' of the functioning of a modern British day surgery facility, and may permit the description of a coherent, practical, and relevant quality assurance package which could be developed and continued over time.

Although much has been written about quality assessment and improvement, information on how this process is initiated and carried out, together with the more important issue of which parameters constitute a definition of quality, is scarce<sup>2</sup>. Furthermore, in an increasingly cost conscious healthcare market, outcome studies, as they relate both to quality assurance and cost benefit analysis, will assume greater importance.

It is hoped that this and the following paper will help to redress this imbalance. The parameters required to define quality at the Addenbrooke's Day Surgery Unit will be listed, and the data collection and processing methods will be described in detail. The aim is to guide those unfamiliar with quality issues through the whole auditing process and enable them to initiate and maintain a similar system, based on the results from a modern day surgical facility in the UK. The results of this specific quality assurance initiative will be described and discussed, although the results and implications of quality assurance in day case anaesthesia are described elsewhere.

## Quality assurance indicators: what constitutes 'quality'?

Audit and quality assurance programmes traditionally divide the focus of their attention between what Donabedian describes as structure, process and outcome<sup>3</sup>. Each area may confer specific potential benefits to both the day to day running of any day surgical facility, and to the maintenance of high standards of patient care. Clinical audit has tended to concentrate on the structure and process of care, but outcome measures have been ignored. However, outcome measures, while often the most difficult to define, are arguably the most crucial for the measurement of successful, high quality day surgery.

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**Table 1.** Quality assurance indicators

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Process:

Numbers booked

Numbers done (both in DSU and elsewhere in the hospital)

Cancellations S/A/P/ including 'who by', reason, whether rebooked/inpatient/no treatment, and GP informed?

Cancelled sessions (whether 'on offer', whether taken up, reason for cancellation)

Where booked

When booked

Where screened

If screened

Non attenders

Waiting times, per speciality and per surgeon

Waiting lists, per speciality and per surgeon

Whether notes present

Whether x-rays present

Whether blood results needed/present

% Utilization of lists booked

% Utilization of lists done

Time lists start (reason for late starts)

Time lists finish (reason for late finishes)

Turnaround time

Duration of pre-op stay

Duration of operation, per surgeon, per operation

Duration of time in recovery

Duration of time in ward

Discharge information – if given, written or oral

Preoperative information – if given, written or oral, if followed

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In the day surgical setting, with the exception of such indicators as unanticipated admission, which have been used to define good quality day surgical care for some time, and studies investigating the factors that predict adverse outcome<sup>4</sup>, other indicators of quality have been surprisingly few and have often been inappropriate for the purpose of assuring quality.

Tables 1, 2, and 3 present a list of quality assurance indicators which the authors have audited. Rather than strict adherence to the headings of structure, process, and outcome, the items listed in Tables 1–3 are grouped together under titles which indicate the area of day unit practice to which they relate. We believe that through a process largely of trial and error, and with the exception of data on costing and cost-benefit which we are still developing, we have defined the essential core of quality indicators in day surgery. Many are to be found in the Day Surgery Task Force Report<sup>1</sup> but the list is neither exhaustive nor complete. Even the development of quality indicators is an ongoing process, which will improve with time and experience, and should change to suit the particular needs of any individual day surgery facility.

### Standards

Day surgery quality assurance, although rapidly expanding, is still a relatively new field. Thus not only are quality indicators not described but also, in many instances suitable standards are unknown. Where possible the standards adopted in this audit were based either

**Table 2.** Quality assurance indicators

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Structure:

Equipment

Problems: not available, not working at all, faulty, poor quality, unfamiliarity

Safety

Compliance with regulations concerning:

Fire

Control of Substances Hazardous to Health (COSHH)

Surgery

Grade of surgeon

Presence of trainee

Type of operation

Complications

Nursing

Training

Grades

Number of nurses

Rotation through different work areas

Skills

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**Table 3.** Quality assurance indicators

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Outcome:

Staff satisfaction

Patient satisfaction including compliance with instructions

GP satisfaction

Specific postoperative audits

1. Pain audit
  - VAS pain scores pre-op, in recovery, in ward, at ½, 1½, 2 h post-op
  - Categorical scores for children
  - Combined with an audit of analgesia and local anaesthesia: pre-op, intra-op, in recovery, in ward, post-discharge analgesia
2. Postoperative nausea and vomiting (PONV) audit
  - VAS scores for PONV at same times as pain scores.
  - Again combined with audit of preoperative risk factors, anaesthetics used, antiemetic requirements
3. Desaturation
  - In recovery: < 94% for > 2 min, whether O<sub>2</sub> given, air-way device
4. Bleeding
  - Presence of abnormal bleeding

Outcome needs

Outpatients, also physio and occupational therapy

General practitioners, health visitors and district nurses

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on published research or experience gained in audits performed at Addenbrooke's DSU over the last 10 years. In some instances, it was apparent from the outset that standards of practice based on the available research fell far short of that which we were already able to achieve in our unit<sup>5</sup>. In such cases we reset the target for quality care, as it was not productive to work to standards which had already been surpassed. In no instances did we feel that standards set on the basis of published data were too high.

In all too many instances, however, standards for day surgery quality issues have never previously been set or

investigated. In these instances standards were set on a 'best-guess' basis by a committee with over 50 years' extensive day surgery experience. When standards were set in this manner, they were deliberately high, as is appropriate to a high quality service. Perhaps in the future many of these standards will have to be lowered, but only after careful consideration of our ultimate objective – high quality patient care. To some, such standards may seem impossibly and inappropriately high but no apologies are made for this. One could argue that standards should be unobtainably high to promote constant striving for improvement. We should aim for the highest quality care and must make certain that such standards are truly unobtainable before they are compromised.

## Methods

Initially DSU staff satisfaction was assessed using an anonymous questionnaire, and a brief pilot audit of 100 consecutive patients was used to eliminate any problems with data collection and analysis. It was then decided to run the quality assurance initiative over the period of 1 month in the first instance, to include 80 clinical sessions and approximately 500 patients. Data on every patient passing through the DSU during this time was collected, and each patient was invited to complete a patient satisfaction questionnaire prior to discharge. At the end of the sample period, questionnaires were also sent to all the general practitioners whose patients use our day surgery facilities. After a period of data analysis and consultation, a series of general and specific recommendations on how to improve the quality of care offered by our unit was drawn up. These recommendations were ratified by the Addenbrooke's Day Surgery Users Committee, consisting of surgeons, anaesthetists, nurses and managers, and were subsequently sent to all DSU users. They were also informed that a subsequent quality assurance initiative would occur after an interval of 3 months, to assess what effect the changes had made on the level of quality and so 'close the audit loop'.

During the audit period, as part of the total quality assurance initiative, specific audits were also undertaken, including audits of perioperative, postoperative and postdischarge complications, e.g. postoperative pain, postoperative nausea and vomiting, postoperative bleeding and oxygen desaturation in the recovery area. These and the audit of anaesthesia-related outcome are described elsewhere. The use and wastage of propofol was also audited by recording, for each list, the amount of the drug actually administered to patients and the amount of the drug discarded at the end of each operating session.

The methods used to collect and process data evolved throughout the course of the audits presented as part of the whole quality assurance package. Figure 1 illustrates one of our original forms. Initially all data was collected 'long-hand' on forms written using a Macintosh computer. The burden of data collection fell on the nursing staff. Without their generous help and dedication such audits are doomed to failure associated with incomplete and inaccurate data. A senior nurse in each area of

their clinical practice (e.g. screening, preoperative preparation, theatre, recovery phase 1 and recovery phase 2) was designated the responsibility of ensuring that data in that patient area was correctly and accurately collected. We were then able to crosscheck the accuracy of our data with theatre logs and statistics which are routinely collected in our unit. Data entry was initially undertaken by hand into Filemaker Pro 2 software, however such methods of data entry were laborious and proved a source of error.

The general practitioner satisfaction audit was the first to utilize the Formic system of computer generated, laser printed data collection forms, optical mark reading and direct data base entry. This questionnaire, in Formic form, was sent to all 300 general practitioners who use the Addenbrooke's Day Surgery Unit and they were requested to return the completed forms within a period of 2 weeks using the hospital postal system. The Formic system was subsequently used exclusively for all data collection. An example of one of the Formic data collection forms is shown in Figure 2.

At the end of each working day forms for each patient were passed through an optical mark reader and loaded directly into our database. Data analysis was performed using D base 4 software. Once read, all forms were then returned to the patient notes to provide a written record of what had taken place.

## Results

The first phase of our quality assurance initiative ran for a period of 1 month and this was equivalent to 80 clinical sessions. During this time 493 patients underwent day surgery in the Addenbrooke's Unit, 14% of these patients were aged <13 yr and 3% >65 yr. The unit performs day surgery in eight surgical specialities, including general surgery, paediatric surgery, ENT, plastics, maxillofacial, orthopaedics, urology and gynaecology. The percentage of the unit's workload provided by each surgical speciality is shown in Table 4, and the percentage of day cases performed by every hospital speciality in the DSU is shown in Table 5. These figures cover the period April 1992 to March 1993.

The results of the quality assurance initiative looking at some of the process measures involved in the working of the DSU are shown in Tables 6 and 7. The tables outline criteria, standards, and outcome measurements. The results specifically looking at outcome in terms of patient satisfaction are shown in Tables 8 and 9. The results with reference to outcome in terms of general practitioner satisfaction are shown in Table 10. The detailed results of the GP satisfaction audit are shown in Figure 3.

## Discussion

### *Data collection*

In any quality assurance initiative in a busy clinical area such as day surgery, it is at the point of data collection

## DSU OPERATIONAL AUDIT 1993 THEATRE LIST DETAILS

**Date :**

	AM		PM	
	Theatre A	Theatre B	Theatre A	Theatre B
<b>Name of Consultant</b>				
<b>Number of Cases BOOKED</b>				
<b>Number of Cases PERFORMED</b>				
<b>Number of Cases CANCELLED P/A/S*</b>				
<b>Number of Patients NOT ATTENDING</b>				
<b>Pts ready 20 mins pre op (Y / N )</b>				
<b>Surgeon present 20 mins pre op (Y / N)</b>				
<b>Anaes present 20 mins pre op (Y / N)</b>				
<b>Grade of Anaes</b>				
<b>Grade of Surgeon</b>				
<b>Time of op session start</b>				
<b>Time of op session finish</b>				
<b>Time last G.A. started</b>				
<b>No. of medical students in theatre Junior staff</b>				

\* Specify Anaesthetist / patient / Surgeon

**Figure 1.** Form showing DSU theatre list details 1993.

where most problems arise. It therefore follows that if the data collection is poor then the audit results are rendered useless and will be open to sample bias<sup>6</sup>. Lillywhite has shown that data collection is often inaccurate and incomplete<sup>7</sup>. While we were able to maintain high standards for the completeness and accuracy of data recorded in our unit, this required considerable motivation and time. The data from both patient and general practitioner audits were less complete, and checking accuracy at source was impossible.

Form generation using computers is a simple task and reduces the problems of database design, however, the correct design of 'long-hand' forms to encourage accurate and complete data collection is a skilful procedure,

and the future will simply transfer these problems to hand-held computers or static screens. The difficulties of form design are, to some extent, insignificant in comparison with deciding what to collect and how to collect it. Furthermore, the audits described here encompass well over 100 000 discrete items of information and the size of the project constitutes considerable data entry and analysis problems.

Designing data collection forms in the Formic system was also fraught with problems, the most important of which was that it was all too easy to produce a form which was 'user-unfriendly'. The Formic system did speed up the process of data entry and analysis considerably, and will be utilized extensively in any further audits



**Table 4.** Workload of the Addenbrooke's Day Surgery Unit by surgical speciality 1993-4

<i>Surgical speciality</i>	<i>% DSU's total workload</i>
General surgery	12
Urology*	10
Orthopaedics	14
Plastic surgery	8
Maxillofacial	14
Gynaecology	34
ENT	8

\*Includes paediatric surgery.

to 'close the loop'. The system is, of course, not without its problems, but at the present time what faults it does have are outweighed by its advantages in terms of rapid and accurate data entry and analysis.

The evolution of the data collection system using Formic was long but has enabled us to develop a system which is easy to use and covers all aspects of day surgery. Such a system may be outstripped in the future by hospital-based computerized data collection and accessing systems, but such systems often have inadequately developed day surgery software, despite the obvious need for accurate information concerning an area of clinical practice which will include so much elective surgery. The data collection system we now operate will at the very least prove useful in enabling us to modify the day surgery software of any hospital computer system which is acquired on our behalf, as we believe we have now defined and identified the key areas for audit.

Apart from easy and accurate data collection, it was considered imperative that whatever system was developed should impose no extra workload on the nursing and medical staff. Initially this was impossible but as the acceptability and accuracy of the system improved it was then possible to dispense with our more traditional and more labour intensive methods of audit and data collection, thus reducing staff workload. Report generation and analysis were also uncomplicated and inaccuracy in data entry was reduced. The ability to provide rapid feedback to nursing staff greatly increased the enthusiasm and accuracy of data collection. Indeed audit with accurate results is a powerful educational tool.

The initial pilot study and the staff satisfaction audit proved useful in focusing attention on various aspects of the process of day surgery in our unit which may otherwise have been overlooked. The pilot study proved useful in helping, in addition, to eliminate the collection of data for which we would subsequently have no use.

#### *Waiting time*

Increasing the percentage of elective surgery undertaken on a day basis may have beneficial effects on waiting lists and the average time patients have to wait for surgery<sup>8,9</sup>. In our own hospital the expansion of the DSU and the associated increase in the number of patients treated, initially saw a dramatic fall in both the number of

patients waiting for elective surgery and the average duration they waited. The effect of a recent spate of government reports<sup>1,5,8,9</sup>, however, has seen increasing numbers of patients booked for day surgery. It is now apparent that waiting lists for day surgery are increasing as the demand exceeds the capacity of the existing day surgery facilities. Waiting time also seems to have the 'knock-on' effect of affecting the number of patients not attending on the day of surgery. It is interesting to note that 45.4% of patients who waited more than 6 months for their surgery, failed to attend on the day. Also of note is that 23.5% of the patients waiting for more than 1 yr were paediatric patients. This is probably a reflection on the number of paediatric surgeons available, rather than the day surgery facilities per se.

#### *Duration of surgery*

The percentage of operations lasting longer than 1 h (1.9%), was nearly double the target we set of 1%. Meridy 1982 has shown that the duration of surgery cannot be related to the incidence of adverse outcome following day surgery. Only one of the nine patients whose surgery lasted longer than 1 h was admitted, and this was because of pain due to the unanticipated extent of the surgery rather than the effect of prolonged anaesthesia. Only one patient in this group was associated with any complication, and in fact the surgical complication (the failure of an orthopaedic drill) precipitated the excessive duration of surgery rather than vice versa.

#### *Number of patients cancelled on the day of surgery*

The 2.5% of patients cancelled on the day of surgery far exceeded the target we had set of 1%. These cancellations were made in equal proportions by surgeon and anaesthetist. While we accept that there will inevitably be those patients who develop colds on the day of surgery, or who no longer require surgery, this cancellation rate must represent either poor preoperative screening or deviation from the operational policy for patient selection. This had led us to increase the amount of data collected for each patient cancelled on the day of surgery, in order to differentiate the causative factors. It has also led us to implement an education policy for all users of our day surgical facilities.

#### *Patients not attending on the day of surgery (DNA)*

The 4.4% of patients who did not attend on the day of surgery exceeded the target we had set. The relationship between the DNA rate and the waiting time has already been alluded to. Patients booked for surgery at our unit come from a number of referring peripheral hospitals. We were interested to see whether the place of booking made any difference to the DNA rate, as patients booked at Addenbrooke's itself are required to visit the unit and complete a preoperative screening questionnaire, whereas those patients booked at peripheral hospitals are simply given a date on which to attend the DSU for the



**Table 5.** Percentage of day cases performed in the DSU for each speciality 1993–4

<i>Speciality</i>	<i>No. of day cases performed in DSU</i>	<i>No. of day cases performed at other sites</i>	<i>Total no. of day cases performed</i>	<i>% of total day cases performed in DSU</i>
General surgery	192	255	447	43
Urology	435	41	476	91
ENT	455	151	606	75
Maxillofacial	677	4	681	99
Plastics	192	379	571	33
Orthopaedics	619	36	655	95
Obs & Gynaecology	1754	47	1801	97
Ophthalmology	0	340	340	0
Neurosurgery	0	44	44	0
Neurology	0	16	16	0
Gen medicine	0	23	23	0
Nephrology	0	14	14	0
Cardiology	0	18	18	0
Rehabilitation	0	218	218	0
Rheumatology	0	34	34	0
Thorac medicine	0	34	34	0
Paed general	0	111	111	0
Paed oncology	0	190	190	0
Haematology	0	660	660	0
Clin oncology	0	1287	1287	0
Total without endoscopy	4326	3902	8228	53
Endoscopy	0	1819	1819	0
Total	4326	5721	10 047	43

**Table 6.** Audit of process in day surgery – timings and cancellations

<i>Criteria</i>	<i>Standard set</i>	<i>Outcome</i>
Number of cases cancelled should be small	Less than 1% of cases booked should be cancelled	2.5% of booked cases were cancelled
Number of patients not attending should be small	Less than 1% of cases booked should not attend	4.4% of booked did not attend
Patients should be ready to be seen before the lists start	95% of patients should be ready to be seen 20 min before the lists start	97.5% of patients were ready to be seen 20 min before the lists started
Surgeons should not be late	95% of surgeons should be present in the DSU 20 min before list start time	61.2% 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 list start time	87.5% 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
Senior surgeons should work in the DSU	90% should be consultants or senior registrars	91% were consultants or senior registrars
Lists should start on time	95% should start within 5 min of official start time	59% started at least 5 min after the official start time
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
The start of GA should not be near to the official finish time of the list	100% of GAs should be started more than (or equal to) 15 min before 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
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 member of junior staff in theatre
Numbers of medical students being taught in theatre should be small	100% of lists should not have more than one medical student in theatre	6.3% of lists had more than one medical student in theatre

GA, General anaesthesia.

surgery itself. Place of booking made very little difference; a finding which rather surprised us as we had anticipated that the visit to the unit before the day of

surgery would reinforce the need to attend and result in a lower DNA rate. It is possible that the larger number of patients booked centrally were waiting longer than their

**Table 7.** Audit of process in day surgery – propofol wastage and discharge criteria

<i>Criteria</i>	<i>Standard set</i>	<i>Outcome</i>
Propofol wastage should be minimal	Less than 10% of the propofol drawn up should be wasted	12.9% of the propofol drawn up was wasted
DSU patients should be accompanied home	100% of DSU patients should be accompanied home	1.9% of DSU patients were NOT accompanied home
DSU patients should be fit for discharge when discharged	100% of patients should have stable vital signs on discharge	100% of patients did have stable vital signs when discharged
DSU patients should be fit for discharge when discharged	100% of patients should be alert and orientated when discharged	100% of patients were alert and orientated when discharged
DSU patients should be fit for discharge when discharged	95% of patients should be tolerating oral fluids when discharged	99.7% of patients were tolerating oral fluids when discharged
DSU patients should be fit for discharge when discharged	100% of patients should be able to sit unaided when discharged	100% of patients were able to sit unaided when discharged
DSU patients should be fit for discharge when discharged	100% of patients should be steady on their feet when discharged	99.7% of patients were steady on their feet when discharged
DSU patients should be fit for discharge when discharged	90% of patients should be able to void urine when discharged	44.9% of patients were able to void urine when discharged
DSU patients should be fit for discharge when discharged	100% of patients should be given written instructions when discharged	95.7% of patients were given written instructions when discharged
Patients thought to require admission after day surgery should be seen by a doctor	100% of patients thought to require admission after day surgery should be seen by a doctor	100% of patients thought to require admission after day surgery were seen by a doctor

**Table 8.** Patient satisfaction audit

<i>Question</i>	<i>Standard set</i>	<i>Outcome</i>
Did you receive enough information about the DSU before you arrived?	95% should respond YES	95% responded YES @1
Do you think the DSU was easy to find?	95% should respond YES	97% responded YES @0
Were you greeted on arrival at the DSU?	100% should respond YES	95% responded YES @0.5
Did you find the pre-op nursing assessment useful?	85% should respond YES	95% responded YES @1.5
On the day of your op was everything adequately explained to you?	100% should respond YES	98.5% responded YES @0.5
Did you see the surgeon pre-op?	100% should respond YES	94% responded YES @0.5
Was this useful?	90% should respond YES	91% responded YES @0.5
Did you see the anaesthetist pre-op?	100% should respond YES	94% responded YES @2.5
Was this useful?	90% should respond YES	96% responded YES @2.5
Did you feel that you had enough privacy when changing?	95% should respond YES	96.5% responded YES @2
Was there too much waiting around?	90% should respond NO	69% responded NO @1.5
Was your pain treated to your satisfaction?	100% should respond YES	71% responded YES @26
Did you experience more pain than you expected?	75% should respond NO	75.5% responded NO @8.5
Did you feel sick after your operation?	95% should respond NO	83% responded NO @4
Were you sick after your operation?	99% should respond NO	95.5% responded NO @1.5

@ = % of non-respondents or N/A.

peripherally booked counterparts, and that this concealed the higher DNA rate of peripherally booked, and so unscreened (until the day of surgery) patients. Our data, however, did not confirm this theory.

#### *The grade of medical staff working in the day surgery unit*

We believe that quality day surgical care should be provided by senior anaesthetic and surgical personnel. We appreciate that this raises issues with regard to the training of junior staff but feel that while such training is extremely important, unsupervised juniors should not be working in the day surgical environment, and that training lists, with a suitably reduced workload to take into

account the slower patient turnover rate, should be considered. Inappropriate techniques practised in the day unit will have an adverse effect on both morbidity and admission rate. However, all too often, service commitments force training requirements to take second priority. As education is so important for the continued provision of quality day surgical care, we urge that this trend is resisted.

#### *Late starting and finishing of lists*

The percentage of lists starting and finishing on time fell far short of our target of 95% within 5 min of the official start/finish time. All start/finish times are clearly set out in the unit's operational policy and are sent to all day

**Table 9.** Patient satisfaction audit

<i>Question</i>	<i>Standard set</i>	<i>Outcome</i>
Were you given enough information prior to discharge?	100% should respond YES	88% responded YES @11.5
Would you recommend the DSU to a friend having an operation?	95% should respond YES	97% responded YES @1.5
Knowing what you now know, would you still have had your op as a day case?	95% should respond YES	97% responded YES @2.5
Would you have preferred to have been kept in hospital overnight post-op?	95% should respond NO	96% responded NO @1.5
Did you think the DSU was efficiently run?	95% should respond YES	98.5% responded YES @1
Did you find the environment cheerful and friendly?	95% should respond YES	99% responded YES @0
Was the DSU a comfortable temperature?	75% should respond that temp was 'just right'	86.5% responded that temp was 'just right' @1.5
What was your overall impression of the DSU?	90% should respond 'good/excellent'	87.5% responded 'good/excellent' @12.5
What was your overall impression of the surgeon?	90% should respond 'good/excellent'	97% responded 'good/excellent' @3
What was your overall impression of the anaesthetist?	90% should respond 'good/excellent'	86.7% responded 'good/excellent' @13.3
What was your overall impression of the nurses?	90% should respond 'good/excellent'	98% responded 'good/excellent' @2
What was your overall impression of the reception staff?	90% should respond 'good/excellent'	97% responded 'good/excellent' @2

@ = % of non-respondents or N/A.

**Table 10.** General practitioner satisfaction audit

<i>Criteria</i>	<i>Standard set</i>	<i>Outcome</i>
GPs should be aware of the existence of the DSU	More than 75% of GPs should know the DSU exists	90.8% of GPs know of the existence of the DSU
GPs should know day surgery is cheaper than inpatient treatment	More than 95% of GPs should know day surgery is cheaper than inpatient treatment	82.2% of GPs knew day surgery offers a cheaper service than inpatient treatment @0.5
GPs should be satisfied with the service the DSU provides	More than 75% should be satisfied with the service the DSU provides	68.1% of GPs were satisfied with the service the DSU provides @25.4
Patients discharged from the DSU should not increase the workload of GPs	Less than 20% of GPs should feel their workload is increased by patients discharged from DSU	49.7% of GPs felt their workload was increased by patients discharged from DSU @28.2
GPs should receive discharge summaries quickly	100% of GPs should receive discharge summaries within 1 week	27.6% of GPs receive discharge summaries within 1 week @55.7
GPs should find DSU discharge summaries useful	75% of GPs should find DSU discharge summaries useful	72% of GPs find DSU discharge summaries useful @24.9
GPs should be aware what types of operation can be performed in the DSU	75% of GPs should be aware what types of operation can be performed in the DSU	61.6% of GPs were aware what types of operation can be performed in the DSU @2.7
GPs should be aware what patient selection criteria are used in the DSU	75% of GPs should feel they know DSU patient selection criteria	31.9% of GPs feel they know DSU patient selection criteria @2.2
GPs should be able to undertake preliminary DSU patient screening	50% of GPs should feel able to undertake preliminary DSU patient screening	51.4% of GPs felt able to undertake preliminary DSU patient screening @25.9

@ = % who replied 'don't know' or who did not answer.

surgery users. Some will argue that a 5 min 'period of grace' is very optimistic but we felt that as the overrunning of operating lists was the most commonly cited cause of discontent amongst the day surgery staff, and the late opening and thus staffing of the unit has significant cost implications, this point was one on which there was little margin for laxity. Further analysis of the database revealed that, not surprisingly, 65.9% of lists which started late, also finished late. The argument sometimes

put forward as an excuse for late arrival in the day surgery unit, that the list could still be finished on time, appears erroneous. The patient satisfaction audit revealed that 29.5% of patients felt that there was too much waiting around before surgery, and the late arrival of medical staff to start operating lists is thus even more inexcusable.

A recommendation regarding the cancellation of patients on the end of lists likely to overrun was made. In

185 out of 300 questionnaires returned. Response Rate = 61.7%

1. Have you heard of the Day Surgery Unit at Addenbrooke's NHS Trust?  
yes (168) **90.8%**      no (16) **8.7%**      no reply (1) **0.5%**
2. Are you aware that for any operation that can be performed on a day case basis in the Day Surgery Unit, the cost of that operation is between 40% and 60% cheaper than performing the same procedure in the hospitals' main theatre?  
yes (152) **82.2%**      no (32) **17.3%**      no reply (1) **0.5%**
3. Are you happy with the service your patients receive from this unit?  
yes (126) **68.1%**      no (2) **1%**      don't know (47) **25.4%**      no reply (10) **5.4%**
4. Do patients discharged following a day case operation increase your workload in terms of surgery consultations or home visits?  
yes (92) **49.7%**      no (41) **22.2%**      don't know (48) **26%**      no reply (4) **2.2%**
5. Of the (92) **49.7%** who replied Yes, patients were seen because of:  
**PAIN**      yes (80) **87%**      no (12) **13%**  
**NAUSEA/VOMITING**      yes (35) **38%**      no (56) **61%**  
**BLEEDING**      yes (45) **49%**      no (47) **51%**  
**OTHER**      yes (66) **71%**      no (27) **29%**
6. Do you receive day-patient discharge summaries within *one week* of the patient's operation?  
yes (51) **27.6%**      no (31) **16.8%**      don't know (90) **53%**      no reply (5) **2.7%**
7. Do you find such summaries useful?  
yes (134) **72%**      no (5) **2.7%**      don't know (35) **19%**      no reply (11) **5.9%**
8. Does your surgery have a Fax machine?  
yes (147) **79.5%**      no (37) **20%**      no reply (1) **0.5%**
9. Do you think we could improve the service that we provide if we were to fax discharge summaries to you?  
yes (137) **74%**      no (22) **11.9%**      not applicable (23) **12.4%**      no reply (3) **1.6%**
10. Do you feel you know what kind of operations can be performed as a day case?  
yes (114) **61.6%**      no (66) **35.7%**      no reply (5) **2.7%**
11. Are you aware of the criteria used to select patients suitable for day surgery?  
yes (59) **31.9%**      no (122) **66%**      no reply (4) **2.2%**
12. Do you consider you could effectively screen patients for day surgery at their initial consultation with you?  
yes (95) **51.4%**      no (42) **22.7%**      don't know (46) **24.9%**      no reply (2) **1%**
13. Would you be interested in coming to an open day/evening at the Day Surgery Unit?  
yes (128) **69.2%**      no (54) **29.2%**      no reply (1) **0.5%**

**Figure 3.** GP satisfaction audit.

the short term it is the patients who suffer from such stringent measures, however in the longer term, we considered that this would bring about the desired change. We also believe that it is important to demonstrate to DSU staff that essential action will be taken on the results of the quality assurance data collected by their colleagues.

#### *Propofol wastage*

The percentage of propofol drawn up and wasted in our unit amounted to 12.9%. This exceeded the target we had set of 10%. Whilst we appreciated from the start that there will inevitably be some drug wastage, this percentage waste amounts to over £3000 sterling per annum. Hospital pharmacy budgets all over the UK are often overspent and propofol is high on the list of drugs on which most money is spent. The audit of such wastage is

the beginning of a detailed cost benefit analysis of anaesthetic and surgical techniques we hope to complete.

Total intravenous anaesthesia, using propofol and alfentanil, is widely used by the authors in their day surgery practice. We utilize this technique of anaesthesia because we believe that it has many advantages which are particularly required in the day surgery setting. The cost of this technique is often cited as an argument for the use of more traditional methods of anaesthesia, although more recently it has become appreciated that the acquisition cost of the drug represents but a small proportion of the total cost of day case anaesthesia, which in turn represents approx. 6–10% of the total cost of a day surgery procedure<sup>10</sup>. Wetchler has rightly urged those who wish to argue from the point of view of cost to consider all costs, and not just the acquisition cost of the drug or volatile agent<sup>11</sup>. If we are therefore to produce a realistic cost benefit analysis of various anaesthetic tech-

niques, we should take into account not only the amount of propofol that the patient actually receives as part of their anaesthetic, but also the amount that, by necessity, will be wasted. An awareness of the amount of this drug wasted, principally as a result of opening the larger containers of propofol near the end of lists, has in itself been sufficient to reduce the amount wasted substantially.

In future we intend to incorporate into our data collection system the facility to cost all day case procedures. At present we have to be content with simply monitoring the cost of the surgical items and anaesthetic agents we utilize. Information on the cost-benefit ratio of day surgery anaesthesia is scarce, but will become of fundamental importance in the very near future.

#### *Discharge criteria*

In our practice senior nursing staff take the responsibility of discharging patients from the unit. This is done on the basis that each patient has met certain criteria which we have found indicate suitability for discharge. The quality assurance initiative indicated to us that the criteria we have adopted required review. The ability to void urine should not be a prerequisite for discharge fitness in the majority of patients. It would be illogical to keep all patients who have undergone short operations for lengthy periods in phase 2 recovery just so that their ability to void urine is demonstrated. It is accepted, however, that in certain surgical procedures, e.g. circumcision, or in situations where caudal anaesthesia has been used, the ability to void urine prior to discharge should be retained as a necessary criterion for that patient's discharge. The concept of operation and anaesthetic-specific discharge criteria may well be more appropriate.

We were concerned to find that not all patients were given written instructions prior to discharge. We believe that due to the effects of even very brief general anaesthesia on memory for new information this is an extremely important indicator of quality day care<sup>12</sup>, and one which we will be interested in carefully reauditing. The importance of providing written patient information is reinforced by the fact that we also failed to meet the target that all our patients should perceive that they had been given enough information prior to discharge.

#### *Patient satisfaction*

The design of questionnaires in order to gauge patient satisfaction with day surgery services is a difficult task<sup>13,14</sup>. In view, however, of the increased consumerism which is becoming more evident in healthcare, we felt that some measure of patient satisfaction should be incorporated into any quality assurance initiative. The questionnaire that we devised asked for both global and specific measures of satisfaction, and also invited comments on those aspects of patient service that we ourselves had omitted to enquire about. Overall, we recorded that most of our patients were satisfied with the service they had received, but that is not to say that there were no areas for improvement. The accurate interpre-

tation of this section of our quality assurance initiative was devalued however by the lack of complete data that is to be expected in such an undertaking<sup>6</sup>.

The subject of patient information has already been discussed. Although the questionnaire revealed that our targeted percentage of patients felt that they did receive sufficient information before arrival in the day unit, we failed to meet the requisite standard with respect to the percentage of patients who felt that, on the day of their operation, everything had been adequately explained to them. This, and the provision of pre-discharge information are two areas where the need for urgent improvement has been highlighted.

At Cambridge, the majority of patient assessments are performed by the nursing staff. These assessments are usually performed prior to the day of surgery in order to facilitate the correction of any patient problems, and minimize the cancellation of patients on the day scheduled for their operation. We were interested to ascertain whether both surgeon and anaesthetist meeting each patient, served any useful purpose on the day of surgery itself, a process which has the potential to cause considerable delay in busy operating sessions. It was useful to find that patients valued such preoperative meetings and therefore their contribution to patient satisfaction, and patient safety, justifies the continuation of this practice.

Only 86.7% of patients rated their anaesthetist as 'good/excellent' which fell short of our target response of 90%. However, 13.3% of patients failed to respond to this question and 21% of patients underwent surgery with local or regional anaesthesia. Patients' assessment of surgeons, however, was 'good/excellent' in 97% of responses.

#### *General practitioner satisfaction*

The purpose of this project was to ascertain the level of awareness amongst local general practitioners of the existence of the DSU and the services provided. An attempt was also made to discover if day surgery increased the GP's workload, if GPs were satisfied with the service they received, and how GPs regarded the 'fast-tracking' day case patients. The interpretation of results was hampered by incomplete response.

Jackson et al.<sup>15</sup> have highlighted the concern amongst GPs that increased day surgery will confer an additional workload on general practitioners. Our results tend to confirm this; while nearly a third of GPs replied 'don't know' or failed to answer this question, nearly half felt their workload was increased by patients discharged from our unit. Inadequate analgesia post-discharge was the main reason (87%) for this increased workload burden, although nausea and vomiting (38%) and bleeding (49%) both attracted high positive responses. We were unable to confirm whether or not post-discharge infection caused a significant problem, as we had only asked for responses to the category 'other', but 71% of GPs answered that they saw patients for such reasons.

The general practitioners audited seemed to feel that

we could improve the level of communication between the DSU and the community by more rapid delivery of discharge data to the GP. Seventy-four per cent indicated that faxed discharge summaries would improve the service, and this is an issue we intend to explore, within the limits of confidentiality.

While the majority of GPs were unaware of the criteria used to select patients for day surgery, 61.6% felt that they knew what types of operation were suitable to be performed on a day case basis, and 51.4% felt that they could effectively screen patients for day surgery. Of great interest to us was the fact that 69.2% of GPs were interested in attending the DSU for the purpose of education in such matters as patient selection and developments in the types of surgery to be performed on a day case basis in the future. The implementation of measures for a series of such meetings is planned.

### Conclusions

In this quality assurance initiative we have demonstrated that it is possible to collect the vast majority of data needed to maintain a high standard of day surgical practice in a busy day unit. The introduction of such a data collection system has resulted in less, rather than more work for the nursing staff, on whom the burden will inevitably fall, and has highlighted a number of areas where our expectations have exceeded the level of quality we have been able to provide. In some instances this heightened awareness has in itself brought about change, whereas in others we intend to implement specific measures to improve the quality of care provided.

The indicators of quality, and the standards utilized in this initiative are dynamic and will continue to evolve as day surgical practice expands. It will be appreciated that while the perception of quality will differ, not only between countries and units, but also between provider and consumer<sup>16</sup>, it is of paramount importance that programmes for quality assurance are commenced in day surgical facilities so that a core of quality indicators and standards of practice may be devised. The expansion of day surgery is driven by many factors, not least of all economic considerations. Quality assurance initiatives will provide, not only an assessment of the quality of care now being provided, but also the means by which quality

can be maintained in the future, in the face of increased demands for greater throughput of cases of enhanced complexity. Finally, if professionals in DSUs are ignorant about their present performance, how may improvements for the future will be planned?

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# Quality assurance in day case anaesthesia

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This paper outlines the implementation of a quality assurance initiative in a busy British day surgery unit (DSU) as this relates to day case anaesthesia. The indicators of quality day case anaesthesia and the appropriate standards of practice, are described. The methods utilized for the collection and analysis of data are described elsewhere, although this paper outlines the methods of scoring used in specific audits of postoperative morbidity. The results of the quality assurance initiative relating to anaesthesia are presented and discussed, and recommendations for future improvement made.

Key words: Quality assurance, day case anaesthesia, audit

## Introduction

The importance of a comprehensive programme of quality assurance in day surgery has been alluded to in other papers<sup>1</sup>. Such a programme, specifically designed to scrutinize day case anaesthesia, has enormous potential, not only for improvement in the quality of patient care, but also as a powerful educational tool to highlight the effects various anaesthetic techniques have in a patient population that needs to be discharged within hours of the cessation of anaesthesia.

Minor morbidity assumes greater importance in day patients as discharge may be prevented or delayed, and yet the range of drugs and techniques available is more limited than in the inpatient setting. Also, any adjuvant therapy may cause morbidity of its own and may, in addition, affect admission rates. It is crucial therefore that those anaesthetic techniques unsuitable for the day case scenario are identified and eliminated from current practice. The investigation of morbidity post-discharge has tended to be overlooked. Even where incidences have been investigated, no measure of severity has been included. As minor morbidity may, if severe enough, delay return to normal function or work, data on severity is much needed. The influence exerted on the incidence and severity of post-discharge morbidity by anaesthetic

techniques can be monitored using a comprehensive quality assurance programme.

Much work has been done to attempt to identify those factors that predict poor outcome in day surgery<sup>2</sup>. As the scope of day surgery increases, it will become vitally important that standards of patient care are not compromised by an increased throughput of more complex operative procedures. The continuous monitoring of modes of practice, especially those thought to include factors that may predict adverse outcome is therefore essential. Quality assurance programmes will also provide valuable information on cost. Although the cost of anaesthetic drugs comprises only a small proportion of the total cost of any day case operation<sup>3</sup>, much attention has been focused on the cost benefit ratio of day case anaesthetic techniques. There is now a need to justify the cost of any anaesthetic technique utilized, and quality assurance programmes will go some way to provide data on both the direct and indirect costs of various anaesthetic techniques.

This paper will describe such a quality assurance programme. The results presented and discussed focus on those aspects of care under the control of the day case anaesthetist, but are part of an overall quality assurance initiative. This paper will describe how such a quality assurance programme was implemented, and will outline those factors which predict quality in day case anaesthesia. Specific audits of morbidity (e.g. pain and postoperative nausea and vomiting) were carried out, incorporating data from patients 48 hours post-discharge, however only the audit of postoperative nausea and vomiting will be described, as will the scoring method utilized. Finally, while the purpose of this study was not directly and accurately to compare different anaesthetic

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**Table 1.** Anaesthetics: quality indicators

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ASA grading
Age including < 13 yr and > 65 yr
Quetelet indexes
Preoperative starvation times, for both fluids and solids
Past medical history, including diabetics, asthmatics, epileptics, hypertensives
Allergies
Drugs
Grade of anaesthetist
Presence of trainee
Type of anaesthetic GA/LA/RA/combo
Premedication
Induction agent
Maintenance
Analgesia, opioids and NSAID
Local anaesthesia including type of block, conc, vol, agent, pre- or postoperative insertion
Airway
Muscle relaxants and reversal agents
Monitoring used
Problems with the anaesthetic including: saturation falls, airway obstruction, arrhythmias, laryngo/bronchospasm, regurgitation and aspiration
Duration of surgery and anaesthesia
Duration of time to Stewards score six: recovery time
Duration of ward stay: time to discharge
Specific audits: pain, nausea and vomiting, bleeding, falls in O <sub>2</sub> saturation
Admission rates

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NSAID, Non-steroidal anti-inflammatory.

techniques, some of the data collected relating to different anaesthetics will be presented and discussed. It is only by the assurance of the many facets of quality in the complex process that is day surgery that standards of care can be safeguarded.

### Quality indicators

Table 1 describes those factors that were audited in the anaesthetic section of the complete quality assurance initiative and are thought to indicate quality anaesthetic care. Some quality indicators, e.g. admission rates, are recorded by most day surgery units<sup>4</sup>, but this paper will concentrate on those primarily relating to anaesthesia. Many have been extensively investigated in relation to the prediction of adverse outcome in day surgery<sup>3</sup>, however many are unmonitored by the majority of day surgery units (DSUs). It can be seen that no attempt has been made to divide these quality indicators into those relating to structure, process, and outcome, as it was felt that little benefit accrues from such arbitrary division. It is important, however, that those indicators of quality relating to both process and structure are not overlooked, as both have potential for improvement of patient care and education. Specific outcome measures of quality, e.g. rates of postoperative pain and nausea and vomiting are included in this section of anaesthetic indicators, although many factors, surgical, anaesthetic, and others, are of relevance in the causation of these adverse outcomes.

### Standards

Where published research has provided incidence rates of outcome quality indicators, these were adopted in this quality assurance initiative, however, in many instances, no standard could be derived from the published data. In these cases, standards were set on the basis of audits performed previously in the Addenbrooke's DSU, and also on a 'best-guess' basis, based on over 50 years' experience of day surgery.

The standards set and utilized were deliberately high, as befits a quality service, and may be modified over time in the light of experience gained in the sphere of quality assurance. All too often, however, the standards used in this section of the quality assurance initiative were thought to be both attainable and relatively modest, even when our practice fell short of the desired level of care. Such revelations are the essential benefit of any quality assurance initiative.

### Methods

The quality assurance initiative described elsewhere incorporated the audits of anaesthetic practices described in this paper<sup>1</sup>. The study period was designated as one month, to include 80 clinical operating sessions. All patients were eligible for inclusion, irrespective of age and anaesthetic type. It was anticipated that this would provide a study group of up to 500 patients.

Data was collected initially using computer generated forms, long-hand, and entered manually. The burden of data collection fell on the anaesthetist and anaesthetic technician, although recovery data was collected by nursing staff. Subsequently data was collected using the Formic system. This speeded up both data entry and analysis, and reduced data transcription errors. The Formic forms utilized to collect some of the anaesthetic data are illustrated in Figures 1 and 2. At the end of the study period, all Formic forms were optically read, all data being entered into D base 4 software automatically, and returned to the patient notes.

Certain common types of minor morbidity following day case anaesthesia were investigated specifically. Such specific audits were planned to run for a finite period of time at set intervals, so that, for example, an audit of postoperative pain would be run for a period of a month and repeated annually to close the audit loop. Pain and nausea and vomiting were both scored using visual analogue scores, and the scoring chart utilized to score nausea and vomiting for 48 h post-discharge is illustrated in Figure 3. Patients were educated in its use while in the unit and were then given copies of the scoring charts to score their morbidity post-discharge. Such specific audits of post-discharge morbidity were run on a smaller scale, and included patient sample sizes of 100 patients. Follow-up data on these study groups was obtained by patient returned questionnaires, in addition to the anaesthetic information collected on a more routine basis by the quality assurance initiative. All data collection was in Formic form.



**ANAESTHESIA**

Name of Anaesthetist \_\_\_\_\_

Name of Surgeon \_\_\_\_\_

Name of O.D.A/Anaes. Assistant \_\_\_\_\_

**PRE-OPERATIVE ASSESSMENT**

Q.1 Previous general anaesthetic Yes  No

*Significant Problems*

*Allergies*

*Drugs*

Queletet \_\_\_\_\_ pulse \_\_\_\_\_ bpm

BP \_\_\_\_\_/\_\_\_\_\_ Hb \_\_\_\_\_

Name:

No.

D.O.B.

Q.2 ASA 1  2  3  4

Q.3 **PREMEDICATION**

None

Diclofenac  Dose \_\_\_\_\_

EMLA

Atropine  Dose \_\_\_\_\_

Ibuprofen  Dose \_\_\_\_\_

Temazepam  Dose \_\_\_\_\_

Q.4 IV Canula Yes  No

Q.5 **INDUCTION** Dose

Propofol  \_\_\_\_\_

Thio  \_\_\_\_\_

Etom  \_\_\_\_\_

Inhalational  \_\_\_\_\_

Other  \_\_\_\_\_

None  \_\_\_\_\_

Q.6 **MAINTENANCE**

Propofol

Enf

Hal.

Iso

Nitrous

O2

Air

Q.7 **VENTILATION** SV  IPPV

Q.8 **AIRWAY** None

Guedel

LMA

Facemask

Oral ETT  Size \_\_\_\_\_

Nasal ETT  Size \_\_\_\_\_

Q.9 **MUSCLE RELAXANT**

None

Sux  Dose \_\_\_\_\_

Atracurium  Dose \_\_\_\_\_

Vecuronium  Dose \_\_\_\_\_

Mivacurium  Dose \_\_\_\_\_

Alcuronium  Dose \_\_\_\_\_

Figure 1. Formic form to collect data on anaesthetic agents T-IGA.

**Q.10 OTHER DRUGS USED**

		Which	Dose
Antiemetic	<input type="checkbox"/>	_____	_____
Antibiotic	<input type="checkbox"/>	_____	_____
Oxytocic	<input type="checkbox"/>	_____	_____
Other	<input type="checkbox"/>	_____	_____

**Q.11 ANALGESIA**

		Dose
Alfentanil	<input type="checkbox"/>	_____
Fentanyl	<input type="checkbox"/>	_____
Morphine	<input type="checkbox"/>	_____
Pethidine	<input type="checkbox"/>	_____
*Diclofenac	<input type="checkbox"/>	_____
*Ketorolac	<input type="checkbox"/>	_____
Other	<input type="checkbox"/>	_____
None	<input type="checkbox"/>	

**Q.12** If DICLOFENAC - Route IM  IV  PR

**Q.13** If KETOROLAC - Route IM  IV  PR

**Q.14 MONITORS**

ECG

NIBP

SpO2

FiO2

ETCO2

N. stim

Other  Specify \_\_\_\_\_

None

**LOCAL ANAESTHESIA**

*Drug*

**Q.15 Bupivacaine**

0.25%  0.5%  0.75%  Adrenal

**Q.16 Lignocaine**

0.5%  1%  2%  Adrenal

**Q.17 Prilocaine**

0.5%  1%  2%

**Q.18 INSERTION** Pre-incision  Post-incision

**Q.19 TYPE OF BLOCK** Regional

Local infiltration

Formal nerve block

**Q.20 PROBLEMS**

Desaturation  Arrhythmia

Hypotension  Laryngospasm

Bronchospasm  Aspiration

Cardiac arrest  Bleeding

Other  None

(please specify) \_\_\_\_\_

**POST-OPERATIVE INSTRUCTIONS**

**Q.21 Oxygen** Yes  No

**Q.22 Special Observations**

Yes  No

Specify \_\_\_\_\_

**Q.23 Patient's Hospital No.**

0	1	2	3	4	5	6	7	8	9
									1000000
									100000
									10000
									1000
									100
									10
									1

Figure 2. Formic form to collect data on anaesthetic agents T-TLA.

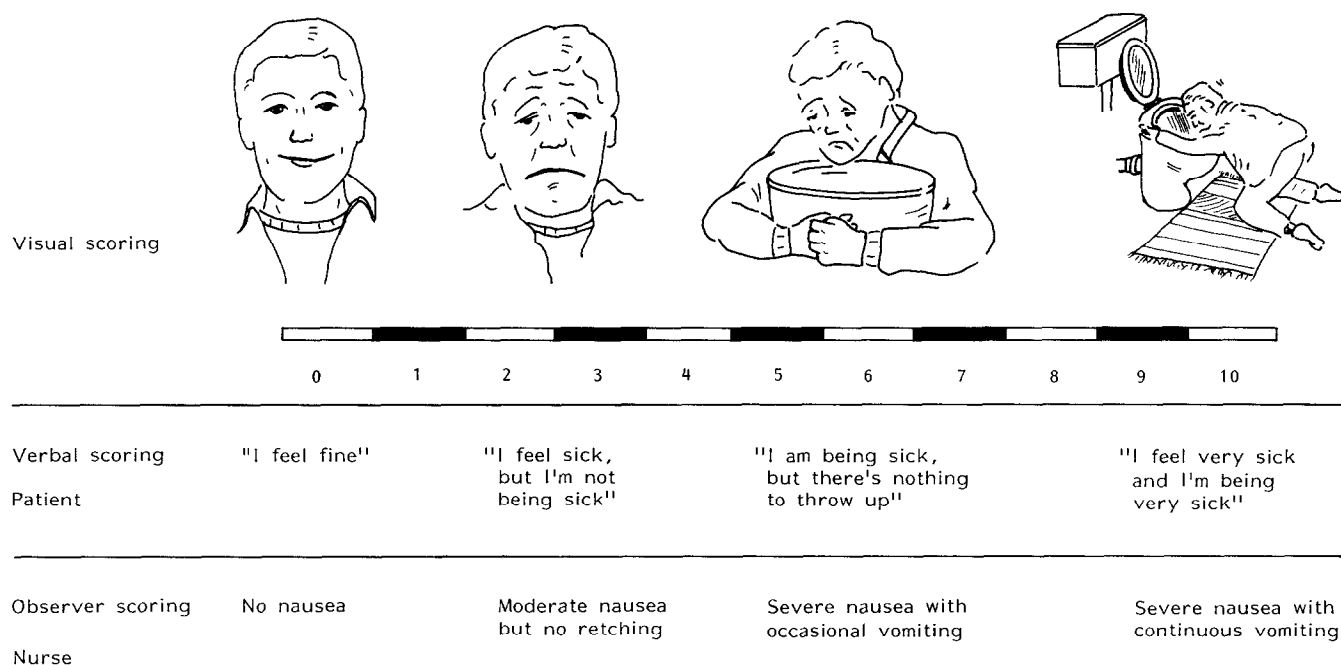


Figure 3. Formic form to collect data on post-discharge morbidity.

Table 2. Day case anaesthesia audit

Criteria	Standard set	Outcome
DSU patients should be fit	100% of DSU patients should be ASA I, II or III	100% of DSU patients were ASA I, II or III
DSU patients should be accompanied home	100% of DSU patients should be accompanied home	1.9% DSU patients were NOT accompanied home
DSU patients for GA should be starved preoperatively	100% of patients for GA should be starved of clear fluids for 3 h and solids for 6 h	0.005% of patients for GA were starved for less than 3 h
DSU patients should not be grossly obese	100% of patients should have a Quetelet index of less than 30	7.3% of patients did NOT have a Quetelet index of less than 30
Most DSU procedures should be performed under GA	80% or more of DSU procedures should be performed under GA	78.8% of DSU procedures were performed under GA
Propofol is the induction agent of choice	90% of inductions should be with propofol	95.3% 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)
Endotracheal intubation is rarely required in the DSU	Less than 10% of DSU patients should be intubated	9.9% of DSU patients were intubated
Muscle relaxation is rarely required in the DSU	Less than 10% of DSU patients should receive muscle relaxants	8.8% of DSU patients received muscle relaxants
Opioid analgesics are required in DSU procedures under GA	90% of DSU patients receiving GA should receive opioid analgesics	87.2% of patients receiving GA were given opioid analgesics
NSAI analgesics are required in DSU procedures under GA	50% of DSU patients should be given NSAI analgesics during procedures under GA	40.7% 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-incision	38.2% of patients receiving LA during procedures under GA did so pre-incision

NSAI, Non-steroidal anti-inflammatory.

The data collected was analysed in general terms to investigate any relationship between quality indicators, but was not subjected to formal statistical analysis. A general discussion of the findings of the quality assurance programme is provided.

### Results

The quality assurance initiative ran for a period of one month and covered 80 operating sessions and 493 patients. Tables 2, 3, and 4 outline the criteria, standards

**Table 3.** Day case anaesthesia audit

<i>Criteria</i>	<i>Standard set</i>	<i>Outcome</i>
The DSU should close on time	100% of DSU patients should be discharged from the ward before 6 pm	3.8% of DSU patients were discharged after 6 pm @ = 11
DSU patients should not suffer from nausea	95% of DSU patients should have no nausea in the recovery area	96.6% DSU patients suffered 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	93.0% DSU patients suffered no nausea in the ward area
DSU patients should not suffer from vomiting	98% of DSU patients should not vomit in the recovery area	98.6% of DSU patients suffered no vomiting in the recovery area
DSU patients should not suffer from vomiting	98% of DSU patients should not vomit in the ward area	95.3% of DSU patients suffered no vomiting in the ward area
DSU patients should not bleed postoperatively	95% of patients should not bleed in the recovery area	98.6% of patients did not bleed in the recovery area
DSU patients should not bleed postoperatively	99% of patients should not bleed in the ward area	98.6% of patients did not bleed in the ward area
DSU patients should not desaturate in the recovery area	99% of patients should not desaturate in the recovery area	96.9% of patients did not desaturate in the recovery area

@ = % of non-respondents or N/A.

**Table 4.** Day case anaesthesia audit

<i>Criteria</i>	<i>Standard set</i>	<i>Outcome</i>
DSU patients should not be in pain postoperatively	95% of patients should have mild or no pain in the recovery area	88.1% of patients 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% of patients 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% of patients had severe pain in the recovery area
DSU patients should not be in pain postoperatively	98% of patients should have mild or no pain in the ward area	84.4% of patients 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% of patients had moderate pain in the ward area
DSU patients should not be in pain postoperatively	No patients should have severe pain in the ward area	1.7% of patients had severe pain in the ward area
Patients thought to require admission after day surgery should be seen by a doctor	100% of patients thought to require admission after day surgery should be seen by a doctor	100% of patients thought to require admission after day surgery were seen by a doctor

and results for the quality assurance of anaesthetic practice. Three hundred and sixty-two patients (78.8%) were given general anaesthesia (GA), 92 patients (20%) were given local anaesthesia (LA) and five patients (1%) were given regional anaesthesia. No patients were given sedation. Twenty-two patients did not attend on the day of intended surgery, six patients were cancelled on the day of surgery by the surgeon and six patients were cancelled on the day of surgery by the anaesthetist.

#### *ASA classification*

ASA classifications<sup>6</sup> were recorded for 474 of the 493 patients undergoing surgery during the audit period. Of these 394 (83.1%) were classified as ASA I, 74 (15.6%) as ASA II, and six (1.2%) as ASA III. Although numbers were small, seven patients (1.2%) in ASA I were admitted compared to two (2.7%) in ASA II, however there was no relationship between anaesthetic-related admission and ASA status.

#### *Preoperative starvation time (NPO time)*

Preoperative starvation data was recorded for 420 patients, however the data did not differentiate between solids and liquids. Ten patients (2.3%) were starved for less than 3 h preoperatively, two undergoing GA and eight LA. Fifty-nine patients (14%) starved more than 3 h but less than 6 h; 120 patients (28.5%) starved for more than 6 h but less than 9 h; 63 patients (15%) starved for more than 9 h but less than 12 h and 168 patients (40%) starved for more than 12 h. Of these, 23 were aged 13 yr or less; 33.3% of children starved for more than 12 h preoperatively. No preoperative starvation time data was recorded for the single patient who was thought to have aspirated during the audit period. Of those patients starved for 6 h or less, two (2.2%) vomited, compared to eight (4.9%) who were starved for 12 h or more.

#### *Quetelet index (body mass index)*

A Quetelet index was recorded for 355 patients. Of these, 329 patients (92.6%) had a Quetelet index of less than 30;

**Table 5.** Maintenance of anaesthesia

Operation	Laparoscopy		Removal 4 wisdom teeth		D&Cs		Vaginal termination of pregnancy		All operations	
	TIVA	Enflurane	TIVA	Enflurane	TIVA	Enflurane	TIVA	Enflurane	TIVA	Enflurane
Number	20	20	14	38	27	37	14	33	104	240
Mean age	33		26		43		25		28	30
Mean BMI	26.6		23.1		25		24		24.5	23.8
Duration of surgery	22.3	28	23.9	27.1	13.5	15	12.7	16.2	24.6	25.3
Recovery 1 time (min)	6.1	4.5	8.7	5.1	4.8	4	5	4.9	6.5	6.0
Recovery 1 time (hr)	3 h	4 h	1 h	1 h	1 h	2 h	2 h	1 h	2 h	2 h
	45 min	22 min	35 min	58 min	38 min	4 min	4 min	40 min	5 min	15 min
Recovery 1 nausea	5%	15%	0	2.6%	0	2.7%	0	3%	0.9%	4.1%
Recovery 1 vomiting	0	5%	0	2.6%	0	0	0	3%	0	1.6%
Recovery 2 nausea	15%	35%	0	2.6%	0	5.4%	0	21%	2.8%	9.1%
Recovery 1 vomiting	15%	30%	0	2.6%	0	2.7%	0	9%	2.8%	5.8%

16 patients (4.5%) had a Quetelet index of between 30 and 31.9; five (1.4%) between 32 and 33.9 and two (0.5%) 34–35.9. Three patients (0.8%) had a Quetelet index of greater than or equal to 36. Of the 26 patients with a Quetelet index of 30 or more, nine underwent LA and 17 GA. Of those undergoing GA, airway maintenance was using a laryngeal mask airway in six, a face mask in eight and endotracheal intubation in three. Of the 14 patients who desaturated to an SpO<sub>2</sub> of <94% for >2 min in the recovery area, despite oxygen therapy, two (14.2%) had a Quetelet index of 30 or more. Of the 12 patients who suffered from nausea in the recovery area, one (8.3%) had a Quetelet index greater than or equal to 30. Of the 25 patients who suffered from nausea in the ward area, one (4%) had a Quetelet index greater than or equal to 30. Of the five patients who vomited in the recovery area, none had a Quetelet index greater than or equal to 30. Of the 17 patients who vomited in the ward area, one (5.8%) had a Quetelet index greater than or equal to 30.

#### Anaesthetic induction and maintenance

Of those patients receiving GA, 345 patients (95.3%) were induced with propofol. No other intravenous (iv) induction agents were used. Seventeen patients (4.6%) were induced by inhalation. Seventy patients (19.3%) were maintained with propofol, nitrous oxide and oxygen; 34 patients (9.3%) were maintained with propofol, nitrous oxide and air; 28 patients (7.7%) were maintained with propofol, nitrous oxide, enflurane and oxygen; 132 patients (36.4%) received propofol for their anaesthetic maintenance; 212 patients (59.1%) were maintained with enflurane, nitrous oxide and oxygen; five patients (1.3%) were maintained with isoflurane, nitrous oxide and oxygen and 11 patients (3.0%) were maintained with halothane, nitrous oxide and oxygen. A comparison of recovery times, duration of ward stay (stage 2 recovery) and the incidences of nausea and vomiting between total intravenous anaesthesia (TIVA) using propofol and alfentanil and volatile anaesthesia using enflurane, nitrous oxide and oxygen is presented in Table 5.

#### Airway maintenance

In the 362 patients undergoing GA, the airway was maintained using the laryngeal mask in 158 patients (43.6%), a face mask in 168 patients (46.4%) and an endotracheal tube in 26 patients (9.9%). The laryngeal mask airway was utilized in all patients who underwent laparoscopy and 33 patients (62%) undergoing removal of wisdom teeth. The one patient who was thought to have aspirated during the audit period was in the face mask group.

#### Muscle relaxants

Of the 362 patients given GA, 330 (91.1%) did not receive any muscle relaxant; eight (2.2%) received suxamethonium alone; 21 (5.8%) received suxamethonium and alcuronium and three (0.8%) received atracurium alone. A total of 29 patients (8%) receiving GA were given suxamethonium.

#### Opioids

Of the 362 patients undergoing GA, 46 patients (12.7%) were given no opioid analgesia. Of this group 10.8% suffered moderate or severe pain in the recovery area and 17.3% in the ward area. One hundred and thirty-eight patients (38.1%) were given alfentanil, 165 (45.5%) fentanyl and 13 (3.5%) were given morphine. Of those given no opioid medication, five (10.8%) were nauseated and four (8.6%) vomited. This compares to 10 (7.2%) nauseated and six (4.3%) vomiting given alfentanil, 17 (10.3%) nauseated and nine (5.4%) vomiting given fentanyl and five (38.4%) nauseated and three (23%) vomiting given morphine.

#### Non-steroidal anti-inflammatory analgesics

Of the 362 patients given GA, 119 patients (32.9%) were given ketorolac and 28 patients (7.7%) were given diclofenac. Of the five patients who were recorded as suffering heavy bleeding in the recovery area, three of these patients (60%) had been given ketorolac; none had received diclofenac. Five patients bled in the ward area, four of these patients (80%) had been given ketorolac,

again none had received diclofenac. One patient was admitted due to excessive bleeding but required no further surgical intervention.

#### *Local anaesthesia*

Of the 459 patients undergoing surgery during the audit period, 92 (20.0%) received LA alone and five (1.0%) received regional anaesthesia alone. The mean age for patients receiving LA was 41 yr (SD 15.62) and this group included 28% (21) of those patients classified as ASA II and 83% (five) as ASA III. The mean duration of ward stay (phase 2 recovery time) for patients in this group was 56 min. No patient in this group suffered nausea or vomiting during their DSU stay, and only four patients suffered mild pain and one patient moderate pain in the postoperative period. The surgical specialities performing surgery under LA were urology (30 operations), general surgery (27 operations), orthopaedics (22 operations), plastic surgery (15 operations), ENT (six operations) and gynaecology (one operation).

Of the 362 patients receiving GA, 260 patients did not receive any supplementary LA. Of those that did, 39 patients (10.7%) received LA pre-incision, 63 (17.4%) received LA post-incision. Of those patients given LA pre-incision, 38% suffered moderate or severe pain during their DSU stay. Of those patients given LA post-incision, 23% suffered moderate or severe pain during their DSU stay.

Of nine patients undergoing laparoscopic sterilization without the use of LA, 55% suffered moderate or severe pain in the recovery area and 33% in the ward area. Of the 12 patients undergoing laparoscopic sterilization with the use of LA, (10 ml of 0.75% plain Marcain), 28% suffered moderate to severe pain in the recovery area and 14% in the ward area.

#### *Postoperative pain*

Data concerning pain in the recovery area (phase 1) was available for 458 patients. Of these, 403 (88%) experienced either no or mild pain, 45 (9.8%) moderate pain and 10 (2.1%) severe pain. Data concerning pain in the ward area (phase 2) was available for 455 patients. Of these, 386 (85%) experienced either no or mild pain, 61 (13.4%) moderate pain, and eight (1.7%) severe pain. Of the 18 patients suffering severe pain, three patients experienced severe pain in both phase 1 and phase 2 recovery. Two of these patients had undergone gynaecological laparoscopic surgery, and the third the removal of wisdom teeth. Only this third patient was admitted due to pain in an operation that lasted 1 h 11 min.

Of the 15 patients suffering severe pain at some time during their DSU stay, six (40%) had undergone gynaecological laparoscopic surgery, and three (20%) had undergone inguinal hernia repair.

#### *Postoperative nausea and vomiting (PONV)*

The relationship between anaesthetic maintenance and the incidence of postoperative nausea and vomiting in

the day unit is shown in Table 5. This data was obtained from the anaesthetic quality assurance data collected on all patients. Of the 22 patients who vomited postoperatively, 15 (68%) had undergone gynaecological surgery: seven underwent laparoscopic sterilization, four underwent VTOP, three underwent laparoscopy and one underwent D&C and hysteroscopy. Two patients vomited following ENT surgery, one after general surgery and one after plastic surgery. Twenty-nine per cent of patients who suffered moderate or severe postoperative pain also suffered from PONV.

The specific audit of postoperative nausea and vomiting included data on 86 patients, 22 male and 64 female. Two patients were aged less than 13 yr and two aged over 65 yr. Eighteen (21%) gave a history of PONV with previous anaesthetics, and 26 (30%) of motion sickness. Despite this, only three patients (3.4%) were given preoperative antiemetics, seven (8%) intraoperative antiemetics, and two (2.3%) postoperative antiemetics. Induction of anaesthesia was performed using propofol in all patients. In 17 patients (19.7%) anaesthesia was maintained using propofol, and in 69 patients (80%) using a volatile agent. Only six patients (6.9%) were given muscle relaxants to aid tracheal intubation and only one patient (1.1%) was ventilated mechanically throughout surgery. No patient was given neostigmine. The laryngeal mask airway was used in 48 patients (55.8%) and a face mask in 32 patients (37.2%). Intraoperative opioid drugs were used in 85 patients (98.8%) (alfentanil 31 patients, fentanyl 52 patients and morphine one patient). No patient received postoperative opioid drugs. Non-steroidal anti-inflammatory analgesics were utilized intraoperatively in 18 patients (20.9%) and postoperatively in nine patients (10.4%). Intraoperative local anaesthetic was utilized in 29 patients (33.7%). Table 6 outlines the duration and severity of nausea and vomiting in the post-discharge period.

#### **Discussion**

The ease with which the data collection system described could be utilized to collect all the necessary information to ensure quality day case anaesthesia has been demonstrated. The indicators of quality we use have been outlined. The data collected permitted the investigation of a variety of relationships between quality indicators, anaesthetic practice, and outcome, although statistical analysis was not performed. It was never our intention to investigate such relationships formally, but to demonstrate that any DSU can collect relevant data in a meaningful and efficient way, to highlight areas where clinical practice is substandard and where formal investigation is needed. The continual auditing of such quality indicators as are felt to be relevant to a particular day unit will provide data to enable the prediction of adverse outcome. Such a predictive capability is feasible for any DSU using a comprehensive data collection system. The quality assurance programme highlighted areas where

**Table 6.** Postoperative nausea and vomiting – severity scores post-discharge

Time	Scores = 0	Score 1–5	Score 6–10
Preop	74 (86%)	12 (14%)	0
Recovery 1	82 (95.3%)	3 (3.4%)	1 (1.1%)
Recovery 2	71 (83.5%)	14 (16.5%)	0
Pre-discharge	75 (87.2%)	11 (12.8%)	0
On arrival home	68 (79%)	16 (18.6%)	2 (2.3%)
Before bed	66 (76.7%)	20 (23.3%)	0
On waking	68 (79%)	18 (21%)	0
Lunch time	71 (82.5%)	14 (16.2%)	1 (1.1%)
Before bed	73 (84.8%)	13 (15.2%)	0
On waking	76 (89.4%)	9 (10.6%)	0
Lunch time	75 (88.2%)	10 (11.8%)	0
Before bed	75 (88.2%)	10 (11.8%)	0

our standards of practice fell short of that desired or predicted and provided us with a focus for future research. It is hoped that such programmes could prove useful in providing similar areas for investigation in other DSUs.

#### *ASA classification*

The data confirms that the majority of patients undergoing day surgery in the UK are in ASA classes I and II. Despite a willingness to offer day surgery to stable patients in ASA III, at the present time few are receiving day surgical care and the majority that do undergo local anaesthesia. It is no surprise that the results demonstrate a positive relationship between age and increasing ASA classification. Although numbers are small there was an increased incidence of unanticipated admission in those patients in ASA II compared to ASA I, however it is of note that surgical factors were principally to blame and anaesthesia did not seem to contribute to this relationship. A quality assurance programme able to examine any possible link between ASA status and adverse outcome is of fundamental importance.

#### *Preoperative starvation guidelines*

Guidelines for preoperative starvation of day patients are currently changing<sup>7</sup>. At Addenbrooke's day unit, we permit patients to drink clear fluids up to 2 h preoperatively, although the data confirmed our suspicion that patients are still starved for excessive lengths of time. In particular, a third of our paediatric patients are starved for in excess of 12 h. The disadvantages of such preoperative starvation have been highlighted by a number of workers<sup>8</sup>. Our results have shown, in addition, that patients starved for longer than 12 h are more likely to vomit postoperatively than those patients starved for less than 6 h. No increased aspiration risk was demonstrated from this reduced period of preoperative starvation. The results of this quality assurance programme have led us to restate our preoperative guidelines to parents to instruct them to give their child a drink of clear fluid 2 h preoperatively. The continuation of the quality assurance programme will reveal the effect of such a change.

#### *Quetelet index*

Quetelet or body mass index guidelines have been used to restrict those patients offered day surgery<sup>9</sup>. Our unit has used a Quetelet index of below 30 as a guideline for patient selection, although the results illustrate that not only is this guideline often ignored, but little increased morbidity is associated with patients of increased Quetelet index. This has led us to revise the preoperative patient guidelines so that patients with a Quetelet index of up to 36 are now offered day surgery, although a Quetelet index of 34 is retained for patients undergoing laparoscopy using a technique of spontaneous respiration through a laryngeal mask. In such patients additional surgical restrictions also apply.

#### *Anaesthetic induction and maintenance*

It is apparent that the advantages of propofol for induction of day surgery patients are generally accepted by anaesthetists. The technique of total intravenous anaesthesia using propofol and alfentanil is also gaining more widespread acceptance, although this technique is still utilized by relatively few anaesthetists. The results of this audit highlight the low incidence of postoperative nausea and vomiting associated with TIVA, even in those patients and operation groups known to be associated with a high incidence of this form of morbidity. Of equal note was that, contrary to other published data<sup>10</sup>, we found that recovery times (phase 1 recovery), as measured from the time the patient arrived in the recovery area to the attainment of a Steward score<sup>11</sup> of 6, was similar in both TIVA and volatile groups, as was the time spent in the ward area (phase 2 recovery). The data collection forms were, however, not designed to measure time to 'fit for discharge'. Our results suggest, however, that TIVA, with its lower incidence of PONV, may mean that patients are fit for discharge sooner. The true value of these results is that if one includes staffing costs in the overall cost of an anaesthetic technique, TIVA, by reducing time to fitness for discharge, may be cost effective<sup>12</sup>. Such cost benefits, however, will only be apparent if patients are discharged when fit to do so, necessitating a change in our discharge policy.

*Airway maintenance and muscle relaxants*

Endotracheal intubation is associated with significant morbidity<sup>13</sup> and yet the quality assurance initiative has confirmed work done previously<sup>14-17</sup> showing that alternative forms of airway management, in particular the laryngeal mask airway<sup>18</sup>, is both safe and effective for a variety of day surgery operations. Although the audits performed do not demonstrate any increased morbidity associated with intubation, they do highlight the safety and effectiveness of the laryngeal mask airway.

The data collected did not permit us to link a patient's satisfaction questionnaire with the rest of the database, although this has been modified for future audits. The high incidence of muscle pains associated with the use of suxamethonium<sup>19,20</sup> as well as the increased morbidity due to intubation may well become evident from future data incorporating this link. The authors concede that suxamethonium may continue to have a place in future day care anaesthesia<sup>21</sup>, although we favour mivacurium for muscle relaxation in those patients in whom we feel intubation is indicated, and regard the indications for suxamethonium to be few. Mivacurium has a duration suitable for most day surgery procedures<sup>22</sup>, and has the additional advantage that reversal is not required, thereby avoiding the use of neostigmine with its associated incidence of nausea and vomiting<sup>23</sup>. The quality assurance data presented, however, leads us to conclude that endotracheal intubation and the use of muscle relaxants, in correctly selected day case patients, introduces a range of minor morbidity with little increase in patient safety. Quality assurance programmes of this sort, by forcing review of current practices and their benefits and drawbacks, are of excellent educational value.

*Pain*

Whilst the results of this quality assurance initiative demonstrated that the majority of day case patients experience little or no pain following surgery, more patients suffered moderate to severe pain than we would have hoped. The management of postoperative pain will thus continue to be the main limiting factor in the selection of suitable operations for future day surgery.

It is recognized that certain operations routinely performed on a day case basis are inherently more painful than others<sup>24</sup>. Certainly our results confirm the place of laparoscopic sterilization and inguinal hernia on the list of such operations. Such operations require the full range of analgesic techniques available to render patients comfortable postoperatively. We believe that the use of potent short-acting opioids intraoperatively, coupled with the use of long-acting local anaesthetic blocks wherever suitable, and the use of non-opioid analgesics pre-emptively and postoperatively, to be the best approach at the present time. This regime will still fail to control postoperative pain in some patients, and the judicious use of intravenous opioids in the immediate postoperative period may be the only effective method of bringing severe pain under rapid control. The development of

treatment protocols for postoperative pain will ensure both safe and effective treatment.

Our unit uses the so called short-acting opioids fentanyl and alfentanil extensively and there is little to suggest that these drugs are major factors effecting the incidence of postoperative nausea and vomiting. Although the use of morphine in our unit is limited and the numbers small, this analgesic seems to confer little benefit in terms of analgesia while having a significant effect on nausea and vomiting. In the light of the work performed by Orkin<sup>25</sup>, we recommend that morphine is no longer used and prefer instead to administer intravenous alfentanil to control severe pain.

The non-steroidal anti-inflammatory analgesics, ketorolac and diclofenac, are used extensively in our day surgical practice. Our data does not allow firm conclusions to be reached on the efficacy of these drugs, as where they are used for a particular type of operation, they are used in the majority of patients and comparative groups are very small indeed. Similarly, firm conclusions could not be reached on the benefit of giving these drugs pre-emptively<sup>26</sup>. Of greater concern, however, is the safety of this class of drugs. While postoperative bleeding occurred in more patients receiving these drugs than those that did not, only one patient was admitted due to bleeding and required no further surgical intervention. The bleeding in the remaining patients stopped spontaneously and did not delay discharge. It cannot be stated, on the basis of our results, that these drugs were either the main cause, or a contributory factor to the incidence of postoperative bleeding in our patients. Indeed the available evidence to date would not support such a claim<sup>27-29</sup>. The quality assurance initiative has drawn our attention to an area where close monitoring of practice and outcome will provide essential information. In time this will enable us to make an informed and logical decision on the place of these analgesics in our day surgery practice. No other problems arose from the use of these drugs, and thus we conclude at the present time that the judicious use of these useful analgesics should continue to supplement other analgesic interventions in the day surgical setting.

It is important also to consider pain following discharge after day surgery. This quality assurance initiative also contains a specific audit of both day unit pain management and post-discharge pain scores and analgesic use. Aspects of such a quality assurance programme, targeting specific day surgery problems will thus enable rational treatment protocols to be monitored for efficacy and compared both with other treatments and indeed other day surgery units.

*Local anaesthesia and laparoscopic sterilization*

Laparoscopic sterilizations are among the routine day case operations that are most often associated with moderate to severe pain. We have found, like others<sup>30</sup>, that injecting 10 ml of plain marcain (0.5-0.75%) onto the fallopian tubes prior to clipping to be an effective supplementary measure in reducing the incidence of



moderate to severe pain in this patient group. We are not aware that the efficacy of this procedure has not been previously documented using 0.75% plain marcain. Study groups in this area of the quality assurance data are small but have confirmed our impression that this simple and safe therapeutic intervention is worthwhile, and is an area of our clinical practice that will receive further investigation.

#### *Local anaesthesia*

The average age of this group of patients was greater than others in the quality assurance initiative. In addition, this group of patients included most of those classified as ASA II or III. It thus seems that despite our willingness to undertake GA where required, in the more elderly and infirm, referral patterns are still directing only those suitable for operation under LA to our DSU. This raises the question of developing a separate clinical area for day case operations under LA, as a more cost efficient use of anaesthetic time. Our result also confirm the safety and minimal morbidity associated with this form of anaesthesia.

We were unable to demonstrate any benefit from the pre-emptive use of local anaesthetic measures in those patients receiving LA supplementation in addition to GA. We feel that the concept of pre-emptive use of analgesics and LA is of value, and will investigate this issue in forthcoming studies.

#### *Postoperative nausea and vomiting*

Our results confirm previous research demonstrating that certain operations are associated with a higher incidence of nausea and vomiting than others<sup>31</sup>. While the number of patients vomiting postoperatively was small, the majority (68%), had undergone gynaecological surgery. Many factors are implicated in the cause of the morbidity and so meaningful analysis becomes difficult. Certain aspects of our practice, e.g. preoperative starvation times, have already been discussed. Our results support no firm conclusions on concomitant pain<sup>32</sup> or the use of nitrous oxide<sup>33</sup>. It would appear, however, that the technique of TIVA, using propofol and alfentanil, is associated with a lower incidence of nausea and vomiting both in phase 1 and 2 recovery and up to 48 h post-discharge. This is surprising in view of the transient nature of the antiemetic effect documented by Borgeat<sup>34</sup>.

The scoring method utilized in the specific nausea and vomiting audit provided visual analogue data, as has been performed by Cohen<sup>35</sup>. We felt that rather than try to differentiate between patients vomiting and retching, or simple nausea, what was most important was some measure of how ill the patients felt. This form of measurement lends itself very well to visual analogue scoring. The logical development of such a scoring system is the implementation of a treatment protocol and its assessment.

#### **Conclusions**

It is apparent that it is relatively easy to collect sufficient data concerning day care anaesthesia not only to assure quality but also to investigate the relationships between many of the patient, anaesthetic and surgical factors that are thought to be associated with adverse outcome. The quality assurance indicators utilized in a day unit just starting such a programme will necessarily have to be more limited than those listed and discussed here. Different day units will regard different quality indicators as more important and will audit accordingly. This paper highlights what is achievable with simple data collection techniques.

The facility to audit such factors continually will ensure that the planned expansion of day surgery does not compromise quality of care and will permit the development of anaesthetic techniques appropriate to day surgery. The extension of audit programmes into the post-discharge period is much needed, as at the present time relatively little is known of patient outcome on return to the community, and the burden placed on carers by seemingly minor factors such as muscle pains caused by the use of suxamethonium. Rational development of day surgery techniques and methods of care can only occur in the light of such information.

In the future, quality assurance programmes will enable the development of a 'weighting system', for patient, surgical and anaesthetic factors, so that for a given operation, in a patient with any given characteristics, and using a given anaesthetic technique, the risk of adverse outcome can be accurately assessed. It can only be on the basis of such a system that the range of operations performed in day units on a potentially increasing patient population can be sensibly controlled in the face of increasing economic pressure for more day surgery.

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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<sup>1</sup> 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<sup>1</sup>. 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

<i>Criteria</i>	<i>Standard set</i>	<i>Outcome 1993</i>	<i>Outcome 1994</i>
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 identify 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 anaesthetists 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

<i>Criteria</i>	<i>Standard set</i>	<i>Outcome 1993</i>	<i>Outcome 1994</i>
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 under-used 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<sup>2</sup>. 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

<i>Criteria</i>	<i>Standard set</i>	<i>Outcome 1993</i>	<i>Outcome 1994</i>
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 not be 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

	<i>No. of patients</i>
Varicose vein surgery	1
Revision of breast scars	1
Inguinal hernia repair	1
Removal 3 wisdom teeth	1
Laparoscopic sterilization	1

**Table 8.** Admissions for postoperative bleeding

	<i>No. of patients</i>
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<sup>3</sup>. 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 anaesthetists 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

<i>Surgical speciality</i>	<i>% of audited cases</i>	
	<i>1993</i>	<i>1994</i>
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

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

# After day surgery: the impact on community healthcare services

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The interface between the hospital and the community is central to the effective expansion of day surgery. This audit examined the workload generated by 450 patients during the 2-week period following discharge after day surgery from hospitals in two health districts. Attitudes of community healthcare professionals were also canvassed. There was a significant, but not overwhelming, call on the community services and the personnel involved were broadly supportive of increasing day surgery activity. The study has identified various factors which might enable patients to manage their own care at home with greater confidence.

Key words: Day surgery, community services

## Introduction

For day surgery patients the sense of continuity of care between the community and the hospital is all important<sup>1</sup>. For this to be realized close collaboration between practitioners in each area is required. There needs to be agreement as to the nature and extent of the contribution which each will make.

In the UK reports have concentrated on hospital aspects of day surgery and recent information relating to the impact on the community has been largely anecdotal. In 1985 the Royal College of Surgeons' guidelines suggested that only 2% of cases need involve a community nurse<sup>2</sup>. The field trials of a day surgery patient satisfaction questionnaire developed for the Audit Commission reported limited use of community nurses and social services<sup>3</sup>. Only 6% of patients expressed a desire for more of these formal care services. About a quarter saw their general practitioner within a month of surgery. This is very similar to the national average<sup>4</sup>. However, Stott expressed concern that day surgery might be transferring a considerable workload and therefore cost to the community services<sup>5</sup>. He then reviewed 448 consecutive day surgery patients in South Glamorgan and concluded that day surgery did not result in a major increase in workload<sup>6</sup>.

In 1992 the East Anglian Regional Health Authority

and the Royal College of Surgeons commissioned a regionwide audit of day surgery services. The Project Team comprised a consultant surgeon, a senior regional nurse, a research registrar and a research nurse. The audit encompassed a range of studies (see Acknowledgements), one of which related to community services. The purpose of this enquiry was to monitor the extent to which community health services were involved with day surgery patients in the 2-week period following their operations. A secondary concern was the journey home and whether or not this occasioned problems for patients. The attitudes of professional groups in the community were also explored.

## Methods

In order to examine the contacts between day surgery patients and community staff a 2-week diary sheet that was easy for patients to complete was required. This was designed by the Audit Project Team in consultation with community liaison nurses and senior community nurse managers. The sheet was tested by the research nurse in an orthopaedic clinic where patients were returning for a consultation 2 weeks after operation. Completion proved simple and no changes were made to the design.

One NHS Trust comprising hospitals on two sites agreed to carry out a pilot study for a 2-week period in March 1993. Permission to undertake the study was obtained from the Local Audit Committee. The chairman of the Local Medical Committee and the Senior Community Nurse Manager were consulted. A briefing meeting was held with senior nurses in the hospitals concerned and the research nurse then discussed the audit with staff on the three wards to be used.

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**Table 1.** Adults and children in the respondent group

District	No. of children (%)	No. of adults (%)
A	44 (16.5)	225 (83.5)
B	46 (25.4)	135 (74.5)

The pilot study demonstrated the feasibility of continuing to a larger enquiry. The same NHS Trust agreed to participate in the main study and the number of wards was increased to five in order to encompass a greater range of day surgery. A second NHS Trust in another district of East Anglia also agreed to participate. Four wards were included at one hospital site. In both Trusts day surgery was carried out from a designated ward and also from general wards, with all patients going to the main theatre suite.

Permission to undertake the main study was sought as before and similar briefing activity conducted. Each ward distributed a diary sheet, covering letter and stamped addressed envelope for reply to every patient attending for day surgery in a 5-week period during June and July 1993. Patients having endoscopy, haematology or pain relief procedures and anyone who required overnight admission were excluded. Children were included and parents asked to return the diary sheets. Patients having a termination of pregnancy were invited to participate but were reassured that no further contact would be made with them. Diaries were to be returned at the end of the 2-week period to the Audit Office in Cambridge and not to the hospital.

The study added considerably to the workload of nurses and clerical staff who were asked to record patient details in a ward diary which was sent to Cambridge each week. Telephone reminders were made by the research nurse to any patient who had consented to give a telephone number and who had not returned their diary within 3 weeks of discharge. All non-responders were sent a written reminder. Data was analysed using the EpiInfo epidemiological package.

As a background to the main community audit the views of general practitioners, community nurses and practice nurses were sought by means of personal interview and questionnaire. They were asked to comment on any problems associated with the current level of day surgery activity and on the potential increase in day surgery in the future.

## Results

Five hundred and twelve diary sheets were distributed and 450 were returned, giving a response rate of 88%. Table 1 shows the proportion of adults to children in the respondent group. The distribution of operations amongst respondents is shown in Table 2. There were no significant differences between respondents and non-respondents in terms of the procedures carried out.

**Table 2.** Distribution of operations in the respondent group

Procedure	No.	%
D&C	66	14.9
Cystoscopy	55	12.4
Laparoscopy	52	11.7
Other gen. surgery	41	9.2
Grommets	40	9
Dental	23	5.2
Vasectomy	22	5
Other orth.	21	4.7
Other ENT	19	4.3
Carpal tunnel decompression	15	3.4
Other urology	15	3.4
Termination of pregnancy	12	2.7
Other ophthalmic	12	2.7
Circumcision	11	2.5
Hernia	9	2
Breast lump	9	2
Other gynae.	7	1.6
Squint	6	1.4
Other	5	1.1
No data	10	0.9

Individual procedures accounting for less than 2% of the total have been included in composite groups.

**Table 3.** Categories of contacts with community healthcare professionals

Category	%
Expected	58
Unexpected	37
Incidental	5

### The journey home

Ninety-two per cent of patients reached home within 1 h of leaving hospital. Nine patients spent more than 2 h on the journey and complications such as pain and sickness presented problems for 15% of patients. Laparoscopy and circumcision were associated with a high risk of complications.

### Once at home

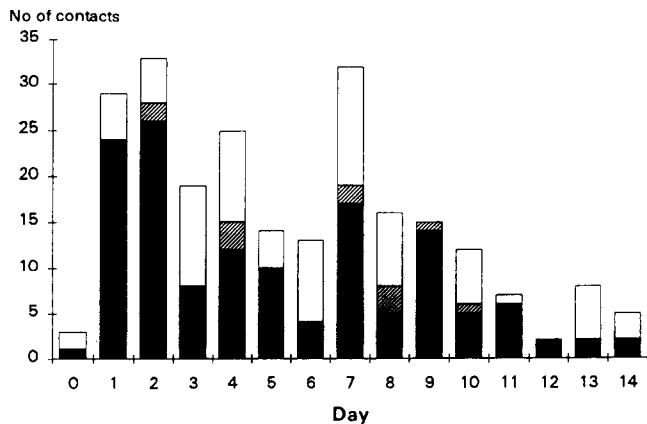
Contacts with health professionals were divided into expected, unexpected and incidental (Table 3). In all 39% of patients made contact once discharged from hospital on one to four occasions (Table 4). The majority (58%) of these contacts were expected and resulted from instructions given by the hospital. One in ten patients had been asked to see their general practitioner to receive histology results, discuss further management or to seek advice about returning to work. Other community healthcare professionals were also consulted, though to a lesser extent (Table 5). Requests to visit a practice nurse were for suture removal or dressing changes. Referral by the hospital to community nurses varied according to the district, involving 2% of patients in one and 9% in

**Table 4.** Number of contacts by individual patients

No. of contacts	% of patients
0	61
1	28
2	6
3	3
4	2

**Table 5.** Proportion of contacts with each professional group

Profession	%
GP	56
Practice nurse	25
District nurse	18
Health visitor	1

**Figure 1.** Frequency and nature of contacts in the community. □ Unexpected; ▨ incidental; ■ expected.

another. These requests were largely to confirm satisfactory progress. Contacts usually entailed a visit but on a few occasions represented only a telephone conversation. Incidental contacts arose from matters unrelated to the day surgery episode.

#### *Unexpected contacts*

In the first 48 h after discharge only 10 patients contacted their general practitioner. A significant number of unexpected contacts were made with health professionals in the first week after discharge (Figure 1). Throughout the 2-week period wound problems and the need for effective pain relief were the main reasons prompting patients to seek professional help, usually from the general practitioner. Practice nurses had a total of 57 contacts, 14 of these were on days one and two. Only three contacts were unexpected. Community nurses made a total of 41 visits. Only two visits resulted from referral by the general practitioner for wound dressing.

#### *Children*

Ninety-one children were included in the enquiry and 15% of families recorded unexpected difficulties following surgery. It was policy in both districts to inform health visitors of a hospital admission for all children up to the age of 16. No parents requested a visit from a health visitor, two families had a check telephone call and one recorded a visit.

#### *Professional attitudes*

Community nurses in the two districts audited expressed no concern about their current involvement with day surgery patients nor about referral patterns. The nurses in one district had some anxiety about a possible increase in day surgery activity. Amongst practice nurses opinion varied as to whether day surgery was increasing their workload. The problems they encountered were common to all surgical patients and included discharge on a Friday without dressings for the weekend and difficulty in interpreting instructions given to them by patients. The practice nurses in one district received no written nursing communication from the hospital.

The majority of general practitioners were in favour of day surgery. They saw advantages in the reduction of waiting times and only a few were concerned by the number of postoperative complications that had come to their attention. Half of the general practitioners indicated that the information reaching them about individual patients was sketchy and delayed and more than half felt that the hospital should be the first point of contact for patients in the immediate postoperative period. Suggested initiatives included nurse liaison posts, a hospital-based helpline staffed by nurses and direct access for general practitioners to admit patients after selected procedures.

#### **Discussion**

In order to measure the involvement of community health services following day surgery the patient as 'key player' was used as the source of information for this audit. An alternative approach would have been to access existing records or to initiate day surgery-specific record keeping amongst the four professional groups. Currently relevant information is not readily available making such an exercise costly and time consuming. At present a minority of community nursing services give day surgery patients a separate code. This community audit demonstrates that patients are willing and able to supply simple, precise information about their experiences at home and suggests that such an approach could be usefully repeated. Important factors in achieving an acceptable response rate include the commitment of ward staff when distributing audit forms, the associated encouragement given to patients and carers to participate and the involvement of a nurse in the telephone reminders to non-respondents.

An hour's journey has been recommended as a criterion-

ion of acceptance for day surgery. There has been a gradual extension of this limit; an understandable tendency in a rural area like East Anglia. The majority of patients in the audit reached home within 1 h but some lengthy journeys were reported. The wisdom and safety of increasing the journey time criterion requires continual scrutiny. With as many as 15% of patients being troubled by distressing symptoms on the journey home there is a need to change practice and re-audit the result.

The unexpected contacts with community health professionals in the first 48 h after discharge are of particular interest. They might not have been necessary had the patient been admitted for short stay surgery. The work generated in this period was not, nor was it felt to be, excessive. It could be that better counselling and appropriate prescription of analgesia might reduce the number of patients requesting advice. The free comments made by patients underline this. While the majority expressed views strongly supportive of day surgery, 15% did point to some deficiencies relating to advice on aftercare, precise information about sutures and an appropriate indication of the amount of postoperative pain to expect. There is a well recognized tendency for patients to expect to recover more quickly after day surgery<sup>7</sup>. If this is not realized disappointment and anxiety may ensue. It would seem essential to offer realistic advice to enable patients to appreciate that any operation requires a recuperative phase, whether carried out on an inpatient or a day case basis.

One hospital did not refer any children for community nursing support. The majority of the unexpected contacts relating to children came from this hospital and on four occasions concerned problems following circumcision. There could be reason for hospitals to review their policies and if they do not already do so, consider community nursing referral or a follow-up telephone call for some paediatric day surgery. Alerting health visitors in good time prior to admission would enable them to flag up any difficulties that might be anticipated from their previous experience with families.

General practitioners often expressed concern that day surgery may overload nursing services. At present this does not seem to be a major issue for the nurses themselves. Day surgery units can measure the workload they generate for community and practice nurses. What is frequently unknown is the workload resulting from secondary referral from the general practitioner. This audit suggested that such a phenomenon is of negligible significance at present.

Both nurses and doctors complained of the lack of information from hospitals. It is essential that after day

surgery patients leave hospital with written information relating to their procedure including advice regarding any intervention that is expected to be necessary by the community healthcare team. A copy of this information should be sent to the GP.

## Conclusion

Day surgery in the two districts of East Anglia audited is creating a considerable but not overwhelming workload for community healthcare professionals. General practitioners have more concerns than nurses at the prospect of an increase in day surgery although they take a broadly supportive stance. Improved counselling and more appropriate prescription of analgesia would enable patients to manage their care at home with greater confidence and with less recourse to professionals. It may be more difficult to develop cohesive strategies for aftercare in hospitals without a dedicated day surgery unit. As day surgery expands the balance of inputs from the community and the hospital will need to be kept under continuing review and discussion about the transfer of opportunity costs is likely to increase.

## Acknowledgements

The report of the Regional Audit 'New Angles on Day Surgery' will appear later this year and include the data presented here. The project team are grateful for the advice of the steering committee which comprised D Davies, HB Devlin, ADN Gelson, JP Hutchby, WN Penfold, N Rushton and JO Williams and also to all those who helped in the conduct of the audit.

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# Quality improvement in ambulatory surgery – the US perspective

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Continuous evaluation of performance and outcomes leading to improvement is currently the focus of continuous quality improvement (CQI) programmes in ambulatory surgery. This can be implemented by developing clinical indicators and acceptable thresholds that are relevant to daily practice, easy to measure and can be used to initiate the analytic process. Collection of data without the ability to analyse it or develop corrective measures is futile. A cooperative effort between physicians, nurses, administrators and other personnel is essential in identifying the responsible individuals for facilitating the programme. Steps in developing a hospital-integrated and free-standing facility are provided and several examples described.

Key words: Ambulatory surgery, quality assurance, continuous quality improvement (CQI)

## Introduction

Continuous quality assessment and improvement (CQI) programmes in ambulatory surgery are geared towards maintaining high quality of patient care and services and ensuring effective utilization of those services and resources. These concepts are not unique to ambulatory surgery. In fact, in the US, the medical field has derived the basic tenets of quality improvement from market industry: customer satisfaction, quality control of goods and services and continuous assessment of the processes<sup>1,2</sup>. Efforts to develop feasible and acceptable methods to assess and assure good quality care have intensified in the US as the government, third-party payers and the general public have become interested in the quality and outcome of health services. Perhaps one of the most notable changes within medicine is the evolution of ambulatory surgery, comprising in the US close to 60% of all elective surgeries. With the intensified effort under proposed healthcare reforms to increase the accessibility of healthcare to Americans, quality improvement and outcome analysis of ambulatory surgery will be even more crucial. Assessing quality requires that attention is given to patient acceptability and satisfaction as well as to the monitoring of clinical outcomes. These form the basis of a continuous quality improvement programme for ambulatory surgery units (ASUs). Their application to a clinically useful programme will be addressed.

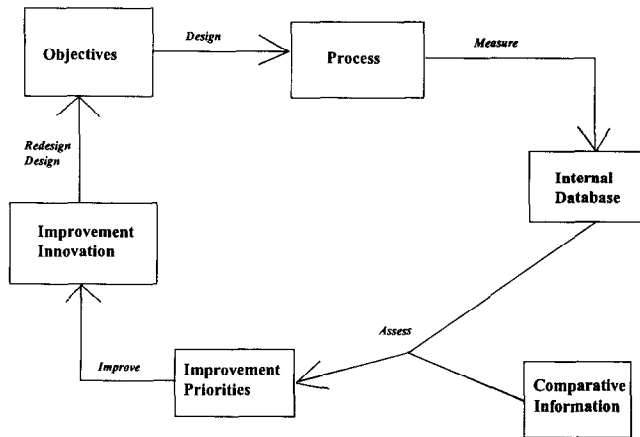
Accountability in the health field is not a new notion. Concern for the adequacy of medical care can be traced to the introduction of medical audits in general hospitals following World War I. The role of the Federal Government has been central to the evolution of quality assessment, mainly through legislative and administrative actions. Peer review organizations and development of utilization review committees became so well integrated in the medical system that they are now accepted practice within hospitals and institutions, along with requirements to earn accreditation and reimbursement. The two major uses of quality improvement data are: problem solving that results in improved patient care, and credentialing physicians and other healthcare personnel<sup>3</sup>.

## Transition to continuous quality improvement (CQI)

Traditional quality assurance (QA), implemented in the 1980s, focused largely on the performance of individual healthcare providers that was below accepted standards and that led to adverse patient care outcomes. This resulted in activities designed to focus corrective measures only at individual problems, frequently taking action only to please outside inspections<sup>4</sup>. The 'bad apple' philosophy inevitably was viewed as a punitive approach to retrospective events. As a result, a modification of the QA model led to the recent development of continuous quality improvement (CQI)<sup>5</sup>. CQI has now become standard language for monitoring and evaluating the capacity and effectiveness of health care in ambulatory surgery in the US. This new paradigm focuses on the performance of the organization within its operating system<sup>6,7</sup>. By analysing human performance in the context of the system in which patient care

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**Figure 1.** CQI performance-improvement cycle. Entry at any point in the performance-improvement cycle can initiate the CQI process.

is provided, global assessment and recommendations for improvement can be made. It is estimated that 80–90% of adverse outcomes result from faulty systems, while only 10–20% actually result from human errors<sup>8</sup>. CQI recognizes that the performance-improvement cycle is connected by the actions of organizational leaders, managers, physicians, other clinicians, trustees and support staff who design, measure, assess and improve their work processes<sup>9</sup>. The performance-improvement cycle of the CQI paradigm has no beginning and no end. An organization may start its improvement effort at any point. This may be the result of modifying an existing clinical process, measuring patient outcomes, comparing performance to other organizations, designing a new service, prioritizing certain issues, or by finding new ways of carrying out functions (Figure 1).

The CQI paradigm incorporates three basic components in its evaluation phase: structure, process and outcome<sup>10</sup>. Structure refers to the organization and resources of the ASU used to render patient care. Assessment of structure involves ongoing monitoring and evaluation to ensure that the physical facilities and equipment are adequate. Process refers to how the organization functions to provide patient care. Assessment of process ensures that there is adequate documentation of appropriate patient management throughout the perioperative period. This information is obtained from the patient's medical record. Outcome refers to actual changes in health status experienced by the patient as a result of medical care. Outcome evaluation has become a major focus. However, process evaluation is gaining renewed interest, as doctors and other healthcare providers are gaining an increased appreciation of the importance of the systems required to ensure the provision of quality health care. Improvements occurring as a result of the integration of these three components should be the direction of the CQI programme.

While the primary focus of CQI has shifted, it still recognizes the importance of individual competence of the medical and hospital staff. Institutional obstacles

must be removed in order to motivate employees and allow them to work at peak performance. The leaders of the healthcare organization must be committed and play an active role to foster the CQI process. These leaders can be administrative, clinical or staff leaders and should be knowledgeable in the concepts and techniques of quality improvement and the processes and systems in their organization. Additionally, they must provide the resources necessary when actions take place and re-evaluate the results. Communication and productivity are encouraged so that all personnel can identify problems and offer solutions.

### Regulation of CQI programmes

CQI programmes in ASUs in the US are governed strongly by the two major American accreditation organizations that are involved in the licensing and accreditation of those facilities: The Joint Commission of Accreditation of Healthcare Organizations (JCAHO) and the Accreditation Association for Ambulatory Health Care (AAAHC). The purpose of these organizations is to organize and operate a peer-based assessment, education and accreditation programme for healthcare organizations so that the highest level of care is provided for recipients in an efficient and economically sound manner. Both the JCAHO and the AAAHC have developed accreditation manuals that are periodically revised and updated. To permit flexibility and encourage innovation and variation, no particular method of conducting quality assurance activities is specified. However, ongoing monitoring of care without evidence of resolving problems does not fulfill the standards<sup>3</sup>.

The JCAHO is primarily involved in hospital-based or affiliated ASUs, and its accreditation manual addresses processes that involve improving organizational performance as reflected in the recent transition from QA to CQI<sup>9</sup>. Previous standards that were specifically identified as 'surgery and anaesthesia services' are now spread throughout the manual and included under standards for assessment of patients (PE), leadership (LD), management of information (IM), improving organizational performance (PI) and medical staff (MS), in addition to a smaller section on surgical and anaesthesia services. These changes are intended to facilitate the organization's continuous evaluation of performance and outcomes leading to improvement.

The AAAHC, which was incorporated in 1979, has been leading the way in the evaluation, accreditation and recognition of high-quality ambulatory healthcare organizations. Some of its members are the Federated Ambulatory Surgery Association (FASA), the American Society of Outpatient Surgeons, the Outpatient Ophthalmic Surgery Society and the American Academy of Facial Plastic and Reconstructive Surgery. Ambulatory surgery centres accredited by the AAAHC also meet conditions for participation in reimbursement programmes and some have also received major professional liability discounts. The accreditation handbook

**Table 1.** Steps in the CQI process<sup>8,9</sup>


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Identify the problem to be addressed
Identify the team to work on the problem
Define relevant terms
Delineate potential causes of the problem
Identify data to be collected
Collect data, including contributions of potential causes of problem
Establish a control that defines baseline state and outliers that might require specific corrective action
Utilize statistics or diagrams (bar graphs, pie charts) to identify the most influential causes of the problem
Analyse the most influential causes
Carry out corrective action
Collect another set of data after corrective action is taken
Utilize statistics or diagrams showing the situation after corrective action was taken
Analyse the most influential causes after corrective action is taken
Continue periodic monitoring

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has specific sections relating to quality assurance, surgery and anaesthesia services and core standards and is periodically revised. There appears to be more flexibility in these standards, recognizing that surgical centres do not have the highly integrated programmes of hospital organizations. At least two doctors are needed to provide peer-based review. In office-based surgical practices, an outside doctor should be involved in order to provide peer-based review. The quality improvement programme of these facilities should address clinical, administrative and cost-of-care issues as well as actual or potential problems affecting patient outcomes. Exclusive concentration on administrative or cost-of-care issues does not fulfil this requirement<sup>3,11</sup>.

The standards of care promulgated by the American Society of Anesthesiologists include basic anaesthesia monitoring, pre- and postanaesthetic care and other guidelines relevant to ambulatory surgery and anaesthesia, and can be used as a foundation for an ambulatory surgery CQI programme. Anaesthesia-related indicators and system problems have included airway, cardiovascular, respiratory, neurological, regional anaesthesia, miscellaneous, discharge planning and catastrophic events. Various decision trees and incident analysis forms have been developed that can be adapted into individual facility programmes<sup>8</sup>.

### Structure of a CQI programme

There are two essential parts to any quality improvement system. The first involves the gathering of data and the second is the evaluation of that data. Collection of relevant data in an objective and non-biased manner should enhance the utility of the performance-improvement cycle. In order to support this model, the health-care organization should provide adequate personnel and physical facilities to obtain the necessary data to be evaluated. A programme is developed that must have an objective and systematic assessment of the cause of those problems; implement actions designed to eliminate or improve the identified issues; monitor and evaluate the activities and document that the highest quality of patient care and services are provided. In addition,

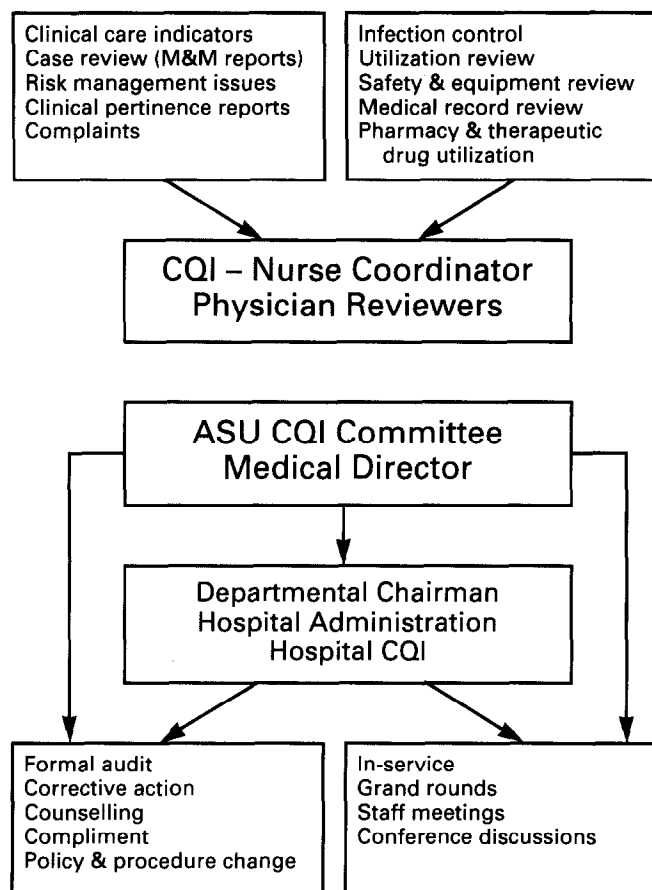
there must be an overall appraisal of the hospital or surgery centre's performance in quality assessment and improvement activities. Data are collected both for the priority issues chosen for improvement and as part of continuing measurement. Table 1 outlines those steps.

Through the use of clinically relevant indicators and complementary methods, information is obtained assessing the actual performance of the ASU and its staff. Information concerning outcome may be obtained from external data sources and internal data sources. Professional review organization reports or professional liability actions are external data sources. Internal data sources consist of the patient's medical record, infection control reports, blood utilization reports, patients surveys, morbidity and mortality statistics, interdepartmental referrals and incident reports<sup>3</sup> (Figure 2). Each facility must not only establish clinical indicators but also thresholds for each of the indicators used by the department. Clinical indicators are used only to initiate the analytical process. They themselves provide neither qualitative nor quantitative evidence of quality. Assessing whether data collection is actually contributing to system changes or existing for its own sake, will improve the efficiency in data management.

### *CQI committee*

Typically, the ASU CQI committee is made up of the medical director, (anaesthesiologist), and when appropriate other members of the anaesthesia care team (e.g. other anaesthesiologists, residents, nurse anaesthetists), in addition to surgeons, the nursing director, ASU nurses and postanaesthesia care nurses, administrators, the director of the admitting and presurgical testing department, infection control and hospital quality assurance representatives. The committee should meet regularly to review issues. Both an integrated-hospital ASU and free-standing ASU should have an integrated committee allowing input from the different representatives. A hospital-integrated ASU allows for broader integration, where referrals are made to the different departments and the committee members serve as a liaison, providing follow-up. The medical director or





**Figure 2.** ASU continuous quality improvement programme. The integrated approach to CQI requires input from multiple sources. ASU, ambulatory surgery unit; M&M, morbidity and mortality. (Reproduced from Twersky 1992, with permission.)

quality improvement support person serve as the committee chair and documented minutes of the meetings are kept. The medical director also reports directly to the hospital-wide quality assurance department, operating room and ASU committees. This integration can also occur within a free-standing facility among the same representatives. The composition of the committee allows for responsiveness to the philosophy of integrated CQI.

#### Corrective actions

An important part of the peer review process is to recommend ways by which quality of care can be improved. It becomes the responsibility of the medical director, or other appropriate departments to hold discussions with the staff, usually at department meetings. The CQI philosophy welcomes any hint or suggestion that a quality problem may exist; it is investigated by the appropriate personnel and corrective action is taken. Feedback to the provider involved with the case is essential. Quality problems involving providers are often amenable to solution through educational means: by providing continuing medical education, inservice classes, additional reference sources and restructuring existing education procedures (Figure 2). Sometimes

just becoming aware that a problem exists is all that is needed for a motivated person to solve that problem. Correction of system defects involves increasing or reassigning staff, altering the use of equipment and supplies and improving methods of communication. Correction of deficient behaviour or performance is best accomplished by counselling staff, altering physician privileges, increased supervision and when necessary, disciplinary action. Whatever approach is taken, individual performance problems should be dealt with in a spirit that fosters personal improvement and improved department performance. Emphasis on quality as a team objective is helpful. Punitive overtones are usually counterproductive. Driving out fear is particularly important. Improvement of patient care is much more likely to result when interdepartmental teams work together than when problems are segregated.

#### CQI programmes

##### Hospital-integrated ASU

A hospital-integrated ASU serves as an excellent example of how a CQI programme can integrate the multispeciality services that provide care in its facility. Data collection and chart reviews are a shared responsibility from among the members of the CQI committee as well as from the ASU personnel. The programme described below provides a practical approach by utilizing clinical indicators oriented towards patient outcome, serving as regular markers for the assessment of care. Modifications of the CQI programme are made when necessary, as well as an annual re-evaluation.

While each facility must determine on its own what is clinically relevant, the following indicators have provided the author's facility with the ability to assess the quality of its healthcare services (Table 2). These particular markers may overlap one another, and therefore individual ASUs may modify them depending both on their applicability and on the resources available to facilitate data collection and evaluation. Collection of data without the ability to analyse it properly or develop corrective measures is ineffective and worthless.

These clinical indicators are assessed continually and reviewed monthly at the CQI committee meetings.

##### Patient satisfaction

Questionnaires are distributed to the patients during the presurgical testing process and prior to discharge

**Table 2.** CQI Clinical indicators for hospital-integrated ASU

Patient satisfaction
Preoperative delays and incidents
Preoperative cancellations
Postoperative follow-up
Readmission to hospital following discharge
Postanaesthesia care unit (PACU) and step-down recovery occurrences
Discharge delay
Infection control
Admission from the ASU
Medical record documentation

following surgery. Patients rate their satisfaction with presurgical testing, anaesthesia, nursing and surgical staff and general preparedness for surgery. Anonymous responses are reviewed. Examples of issues encountered and corrective actions include:

1. Long waiting time during presurgical testing – following a time-study, a threshold for average time spent was determined. Staff assignments were redistributed and extended hours were provided in order to schedule patients so they could be examined within the acceptable time frame. Additionally, a patient information brochure was developed in order to improve patient preparation for presurgical testing.
2. Patient's confidentiality and privacy – individual cubicles are separated by curtains in the ASU; a consultation room is available for physicians to speak to family members; larger-sized gowns and disposable pants are available.

#### Preoperative delays and incidents

Efficient use of the operating room requires minimal delays regardless of whether they are the result of patient, doctor, staff or facility factors. Delays are tracked and trended and reported monthly. Examples of issues and corrective actions include:

1. Delays – patients are instructed to arrive 2 h prior to surgery; some surgeons have requested that all their scheduled patients arrive at the same time to allow for flexibility in cases should a delay be encountered.  
ASU cases are prioritized in the schedule to permit completion of cases and sufficient recovery within the operating hours of the facility. While this may not always be feasible in an integrated operating room, it is strongly encouraged. Additionally, should radiological or laboratory tests be required preoperatively, ASU patients are prioritized.
2. Preoperative medication not given 1 h prior to surgery – the doctor is now notified by the nursing staff when this occurs and when feasible, an intravenous form is ordered; in some circumstances, patients are instructed to take medication at home prior to leaving for hospital.

Other incidents include falls, drug reactions, medication errors – although infrequent, their occurrence would require evaluation within the 'structure, process, outcome' paradigm to determine if corrective action could be taken.

#### Preoperative cancellations

Another measure of efficiency is by keeping cancellations to a minimum (below 2%). By tracking and trending the various reasons for cancellations, efforts can be directed at correcting the causes. A change in medical status of the patient from the time of presurgical testing until the day of surgery accounts for the majority of

cancellations and cannot be reduced. Other reasons for cancellation may include medical work-up not being completed, equipment problems, patient refusal, patient not showing up, NPO orders not maintained. Some of these may reflect system errors and should be trended to identify whether they are provider- or patient-related.

#### Postoperative follow-up (including readmission and infection control)

Patients are contacted by telephone 24–72 h postoperatively to assess their recovery. This author's facility instituted an evening phone call to patients that are classified as ASA 3 or higher. Some facilities have an additional patient contact at 7 and 30 days postoperatively<sup>12</sup>. It has been reported that morbidity and mortality following ambulatory surgery is rare<sup>13–15</sup>. However, each facility must track and trend its own morbidities and mortalities.

**Readmission following discharge:** To supplement the nurse's postoperative phone call, the hospital's computerized database will identify patients that were readmitted to its hospital or returned to the emergency department within 30 days following ambulatory surgery. Readmissions are frequently anticipated and related to the original surgery (i.e. scheduled mastectomy, treatment with additional chemotherapy, lithotripsy). No further action is taken, however, emergency department visits are also reviewed to determine whether they are surgically related (see below). All problems encountered by the nursing staff are recorded for review and referred to the surgeon or anaesthesiologist when appropriate.

**Infection control:** Postoperative follow-up serves as one of the resources for identifying postoperative infections. While postdischarge fever and wound infection occur very infrequently following ambulatory surgery, their incidence is tracked and trended. ASUs are not uniform in their method for tracking this parameter<sup>16–19</sup>. Frequent use of perioperative antibiotics and discharge prescriptions explains this facility's overall low incidence of postoperative infection. Admission to the hospital immediately following ambulatory surgery, related to fever and need for parenteral antibiotics would also be included in infection control evaluation. Examples of issues encountered and corrective actions include:

1. Patients returning to the emergency department following discharge – the most common reason for returning to the emergency room in the author's institution was because of bleeding, following dilatation and curettage (D&C) or termination of pregnancy. Because bleeding was not significant in the majority of cases, specific discharge instructions were developed by the Department of Gynaecology to address commonly anticipated problems specific for these procedures. This parameter also highlighted the availability of surgeons during off-hours and identified the need of some providers to sched-

dule postoperative follow-up appointments on weekends.

2. Common side effects following surgery and anaesthesia – this is reported very infrequently subsequent to written and verbal discharge instructions provided to the patients and their family members. Additionally, when the anaesthesiologist evaluates the patient for discharge, he/she explains again the common side effects anticipated following anaesthesia. Patients that have received spinal or epidural anaesthesia are provided with a 'phone number to call should they develop postdural puncture headache following the initial follow-up 'phone call.

#### Postanaesthesia care unit (PACU) and step-down recovery

**Occurrences:** While there is no minimum stay post-operatively in the ASU, certain occurrences would result in prolonged stay and additional intervention. These may include postoperative cardiorespiratory events requiring medical treatment, (i.e. reintubation, bronchospasm, hypertension, hypotension, arrhythmias, etc.) or admission to the hospital. Their occurrence should be evaluated and trended. Each facility must develop an acceptable threshold of postoperative events evaluating only those occurrences that fall out of the threshold.

**Discharge delay:** With the use of appropriately-tailored anaesthetics, patients are frequently discharged within 2 h of surgery. However, the need for continued observation as discussed above should be tracked and trended. Pain management and nausea and vomiting account for delay in discharge and have highlighted the need to treat these symptoms quickly and appropriately. Patients waiting for their escorts account for delay in discharge; lack of patient escort occurs infrequently, resulting either in hospital admission or patient signing out against medical advice. All attempts are made to discourage this practice. Examples of issues encountered and corrective actions include:

1. Inability to void – a re-evaluation of voiding as a criteria for discharge enabled patients to be discharged sooner. However, patients that received spinal or epidural anaesthesia, or those who underwent anorectal, urological or hernia procedures, or as specified by the surgeon are required to void prior to discharge.

#### Admission from ASU

All admissions from the ASU are reviewed and categorized into surgical, anaesthesia, medical, social, administrative or miscellaneous reasons. Surgical reasons still account for the majority of admissions and may include: more extensive surgery, bleeding, surgical complications, inappropriately booked as ASU and antibiotic treatment. Integrated-hospital facilities vary in their admission rates<sup>20-22</sup>. This facility averages about 2%. While it may seem that admissions may be unantic-

ipated, many may be predicted and efforts at reducing those should be actively sought<sup>20,23</sup>. Anaesthesia or anaesthesia-surgery-related reasons may include pain, nausea and vomiting, respiratory observation, or prolonged recovery from anaesthesia. Appropriate selection of short-acting general and local anaesthetics should be incorporated into anaesthetic practice, in addition to instituting strategies to reduce pain and nausea and vomiting. Administrative reasons may be related to the structure of the ASU, resulting in late starts in the operating room. This may necessitate prioritizing ASU cases or extending the operating hours to accommodate the scheduled cases. Each admission and surgeon's response is reviewed. When needed, referrals are made to the department chairmen. Examples of issues encountered and corrective actions include:

1. Certain procedures are frequently admitted after ambulatory surgery – through the CQI process, procedures that frequently required overnight admission were identified (sinus surgery, TUR bladder tumours), and through utilization review, the procedures are booked as a 23-h observation admission from the onset.
2. Procedures that are booked as possible extensive surgery are treated as an inpatient booking. This is done internally with the hospital, as many insurance carriers are inflexible in changing the admission status from ambulatory to inpatient. This results in better utilization of the ASU and anticipation of the need for inpatient beds.

#### Medical record documentation

A random sample of medical records are reviewed for clinical pertinence and supporting documentation. The criteria are established by the medical staff. However, many facilities are governed by the JCAHO, AAAHC and state agencies for their requirements of completed documentation (i.e. history and physical, appropriate laboratory testing, operative report, doctor's notes, discharge evaluation and instructions, etc). Additionally, requirements for reimbursement necessitate chart completion. This clinical indicator is dealt with by the Medical Records Department and reported upon monthly. Doctors are notified of the deficiencies in charting.

#### *Freestanding ASU (adapted from Twersky (1992) and Twersky and Barlow (1991))*

It is essential that a freestanding surgery centre QA programme be both comprehensive and streamlined to be compatible with the time restraints imposed by efficient staffing patterns. Just as with the hospital-integrated programme, it can be refined so that it is conducted and documented on a continual basis and requires only a monthly summary of the results to the CQI committee. Staff nurses assigned to each segment of the programme conduct the documentation and reporting of the monthly results. Elements of the

**Table 3.** CQI clinical indicators for free-standing ASU

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Preoperative greeting and evaluation
Operating room (OR) procedures
Laser safety
Infection control
Postanaesthesia recovery
Pharmacy
Medical Records
Facility assessment
Anaesthesia quality assurance

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programme are shown in Table 3. Many of the components of the CQI programme in the free-standing facility are not contained within the hospital-integrated clinical indicators, (i.e. operating room procedures, laser safety, pharmacy and facility assessment, anaesthesia quality assurance) and reflect the independent operation of the facility. Compliance in these areas is documented and trended.

### Conclusion

Does a good CQI programme improve outcome? A large database of information would be required to reach a scientific conclusion and that is not currently available. It is desirable, through the CQI process, to collect more standardized information, that can be shared by different facilities as a benchmark for performance. However, even without the hard data, it is indisputable that maintaining patient safety by the use of monitoring and evaluation through CQI forms an integral part of the delivery of health care.

The success of the ASU CQI programme lies in its leaders seeking ways to improve patient care well beyond mere compliance with minimum standards. If anaesthesiologists, nurses, surgeons, ancillary staff and administrators work together to solve system problems, then it is to be hoped that improvement in patient care will occur. It is important that ASUs establish a well-defined CQI programme, so that it can respond to the changes that are expected to take place in the American healthcare system. The ASU CQI programme, regardless of whether hospital-integrated or free-standing, should have as its goal the desire to enhance the quality of care continuously.

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## Accreditation of ambulatory surgery centres utilizing universally acceptable clinical indicators – is it achievable?

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Sophisticated high quality ambulatory surgery is well developed in some countries but minimal in many others. It is essential that quality and safety in day surgery centres be as high as in overnight stay hospitals. Accreditation systems have been developed in some countries with advanced ambulatory surgery services. A universally acceptable accreditation system, based on clinical indicators would be ideal and this may be an appropriate project for the newly formed International Association for Ambulatory Surgery.

Key words: ambulatory surgery, clinical indicators, universal, accreditation

Ambulatory (day) surgery is now recognized as a safe and economic service applicable to approximately 50% of surgical procedures and it is likely that an even higher figure will be achieved in the future. The remarkable development of high technology equipment, both surgical and diagnostic, has so modified many of the more complex operations and interventional diagnostic procedures that they can be carried out on a same-day basis rather than requiring admission into traditional overnight stay hospitals. There is every indication that these technological advances will continue and an even greater number of more major procedures will be treated as ambulatory surgery in the future.

The practice of sophisticated, high quality ambulatory surgery varies widely from one country to another, it being well advanced in the USA, UK, Australia, Canada, Belgium and South Africa, whereas in most other European countries it is in its infancy or nonexistent. There is minimal documentation of the extent of ambulatory surgery in Eastern Europe, Russia, China, Japan, Asia, South America and North Africa.

During 1993 at the 2nd European Congress on Ambulatory Surgery, a group of interested countries took the initiative to form an International Association for Ambulatory Surgery, one of the main objectives of this Association being to promote the development and expansion of ambulatory surgery in those countries

where this important healthcare service has not been established.

It is essential that the safety and quality of service in ambulatory surgery centres be no less than that provided in overnight stay hospitals. There is a body of opinion that the quality of ambulatory surgery is, in fact, higher than for overnight stay surgery, e.g. cross infection and the risk of deep venous thrombosis are minimized, and psychological trauma is reduced, especially for children. Improved surgical and anaesthetic techniques reduce postoperative complications. Several countries have already introduced accreditation of ambulatory surgery centres to ensure safe and high quality service. At the present time these accreditation systems are complex and expensive with emphasis on structure and process rather than on the quality of outcome.

There should be a clear distinction between the licensing of ambulatory surgery centres, which is a function of government health authorities, and accreditation which should be the responsibility of medical professional and allied bodies. Licensing should ensure that standards of structure and safety are acceptable with accreditation being directed to the assessment of quality of outcome.

In Australia, during 1993, the National Day Surgery Committee made an intensive study of clinical indicators which might effectively and economically assess the quality of service in ambulatory surgery centres. The four clinical indicators identified by the Committee are as follows:

### *Cancellation on the day of surgery*

This could be a decision by the patient for a very good reason, however it may be an indication of failure of the

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centre to provide appropriate instructions (e.g. medications), failure of the patient to understand the instructions (e.g. language difficulties) or a general lack of motivation and determination by the patient to have the operation.

Cancellation on the day of surgery may also occur when the patient is found to be unfit for anaesthesia following arrival at the centre. This may be due to an unrecognized concurrent medical problem, failure of the patient to carry out appropriate instructions concerning an unrelated condition or the development of an inter-current illness immediately prior to the operation (e.g. upper respiratory tract infection, gastroenteritis).

In summary, there are a number of reasons for the cancellation of an operation on its planned day and some of these are unavoidable. Nevertheless, both the treating surgeon and the management of the ambulatory surgery centre should develop a simple, precise admission system to assist patients and minimize cancellation on the day of operation. In this context, the treating surgeon has an important role in the selection of appropriate patients for ambulatory surgery with regard to both the procedure and the patient's fitness for anaesthesia.

#### *Return to theatre*

This indicator has universal application to both overnight stay surgery and ambulatory surgery and would reflect the development of complications related to surgical technique or the failure to detect co-existing but possibly unrelated pathology, which would have an immediate adverse affect on the operation (e.g. a bleeding diathesis). The latter should be detected by the treating surgeon before the operation. There will always be the occasional unexpected operative complication, but this should be a rare occurrence and emphasizes the importance of acquiring a surgical technique appropriate for ambulatory surgery. Ambulatory surgery requires a high level of surgical practice and skill, and the appropriate training of surgeons cannot be over-emphasized.

#### *Unplanned overnight admissions*

It is accepted that a very small number of ambulatory surgery patients will require transfer for overnight(s) stay in hospital and the majority of these will be due to a major surgical or anaesthetic complication requiring further surgery or ongoing postoperative management (intensive care).

A significantly increased number of unplanned overnight admissions might be an indicator of inappropriate ambulatory surgery practice. The reasons are multifactorial and include unsatisfactory selection of patients by the surgeon (e.g. major operation and/or inexperienced surgeon), delayed recovery from the anaesthetic (the result of a variety of circumstances including high anaesthetic risk patients and/or inexperienced anaesthetist) and failure of the centre's management (e.g. accepting elderly patients with or without physical/medical infirmities and/or unsatisfactory home care back-up).

#### *Delayed discharge*

This indicator applies specifically to ambulatory surgery. For administrative purposes, it can be defined as a period of more than 6 h from the time of leaving the operating theatre and may be an indicator of unsuitable choice of procedure, unsuitable anaesthetic and/or inappropriate choice of patient.

Since 'street fitness' after many procedures may be reached in as little as 1 h or be considerably longer for other procedures, delayed discharge relates to the anticipated recovery time for each patient and procedure. It is essential to ensure a rapid recovery from the anaesthetic so that patients are fit for discharge in an acceptable period of time from the operation. Any significant number of delayed discharges would seriously affect the throughput of patients in ambulatory surgery centres. The training of anaesthetists to develop appropriate anaesthetic techniques for ambulatory surgery is essential.

#### **Comment**

The organization responsible for accreditation in Australia is the Australian Council on Health Care Standards Clinical Evaluation Programme and, in conjunction with the National Day Surgery Committee, it is conducting a 12-month field test of these clinical indicators at a selected number of ambulatory surgery centres (approx. nine), both free-standing and hospital located, private and public. The format of this field test is very simple and the appropriate details are included for information (see Appendix).

Standards of medical practice and healthcare services vary from one country to another and their economic resources have a major bearing on the development of hospitals and the availability of high technology procedural/diagnostic equipment and services. Ambulatory surgery centres are markedly less costly to build and administer than modern highly sophisticated acute bed hospitals, the latter requiring an extensive administrative structure, ward accommodation, hotel services (catering, laundry, cleaning, waste disposal etc.), nursing accommodation with support services and a wide range of paramedical services.

The establishment of ambulatory surgery centres, in which approximately 50% (or more) of the most common surgical procedures can be carried out, should be attractive to those countries with limited economic resources.

It would be ideal if a worldwide acceptable accreditation system based on clinical indicators could be developed which is simple, economic and effective, yet adaptable to healthcare systems of varying standards and sophistication. The International Association for Ambulatory Surgery might consider a worldwide trial of clinical indicators for quality assurance as the first stage of establishing universal standards for high quality and safe ambulatory surgery practice in all countries, regardless of their socioeconomic status and resources.

## Appendix

The following is an extract from The National Day Surgery Committee and the Australian Council on Health Care Standards Care Evaluation Programme Field Test of Clinical Indicators for Day Procedure Facilities. If field testing proves to be successful as an assessment of the quality of day surgery/procedure care, clinical indicators may form the central focus for the future accreditation of day surgery facilities.

### Rationale

The choice of these four indicators was made on the basis that they may:

- Provide evidence of the appropriateness of selection of patients for management in a day procedure facility and the appropriateness of the booking system.
- Reflect possible problems in the administration of anaesthesia or sedation.
- Reflect possible problems in the performance of a procedure.

### Indicator 1: Cancellation of booked procedures

Indicator topics:

- Failure to arrive
- Cancellation of the procedure after arrival

Definition of terms:

- Arrival Sighted by staff
- Cancellation Non-performance of procedure

Type of indicator:

These are comparative rate indicators addressing the process of patient care.

Indicator data format:

- Clinical indicator no. 1.1
 

Numerator	Number of patients who fail to arrive
Denominator	Number of patients booked
- Clinical indicator no. 1.2
 

Numerator	Number of patients whose procedure is cancelled after arrival
Denominator	Number of patients who arrive for procedure

### Indicator 2: Returns to theatre

Definition of terms:

- Return to theatre Re-entry to operating/procedure room for a further procedure

Type of indicator\*:

This is a comparative rate indicator addressing patient outcomes.

Indicator data format:

- Clinical indicator no. 2
 

Numerator	Number of patients returned to the operating/procedure room on the same day
Denominator	The number of patients in the time period under study

\*This is expected to be an episode of low occurrence, i.e. a sentinel event. It would be expected that the facility would review each occurrence in its Quality Assurance Programme and provide evidence of that review.

### Indicator 3: Unplanned overnight admission

Indicator topics:

- Transfer from the day procedure facility to an overnight facility
- Admission to another health facility within 24 h of discharge from the day procedure facility

Type of indicator:

These are comparative rate indicators addressing patient outcomes.

Indicator data format:

- Clinical indicator no. 3.1
 

Numerator	Number of unplanned transfers of patients directly from the day procedure facility on the same day
Denominator	Number of patients treated in the day procedure facility in the time period under study
- Clinical indicator no. 3.2
 

Numerator	Number of patients admitted to another facility within 24 h of discharge from day procedure facility providing the initial care
Denominator	Number of patients treated in the day procedure facility in the time period under study

\*This numerator should include those patients admitted to another facility and not kept overnight, and those returning to the same facility within 24 h. Problems in relation to data collection for this indicator are anticipated.

### Indicator 4: Delayed patient discharge

Definition of terms:

- Delay Greater than 6 h from the time of leaving the operating/procedure room to the time of discharge from the facility

Type of indicator:

This is a comparative rate indicator addressing patient outcomes.

Indicator data format:

- Clinical indicator no. 4

Numerator Number of patients who fail to be discharged from the day procedure facility more than 6 h after leaving the operating/procedure room

Denominator Number of patients having a procedure in the time period under study

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