Brief Review

The cost of an established quality assurance programme: is it worth it?

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Although the literature concerning quality assurance (QA) is voluminous, little information exists about the costs or benefits of departmentally based QA programmes. We measured the direct costs and then investigated the financial and non-financial benefits derived from a well-funded QA programme over a period of five years. Data were obtained from departmental budgets, annual reports of the QA programme, and several databases used by the programme. The average annual cost was \$79,900, with salaries being the largest component, while \$14,300 each year were recovered through the activities of the programme. True costs were higher than those calculated since time volunteered by medical staff and resources shared with other programmes could not be determined. Some of the costs encountered at the outset of this programme were later offset by the use of commercial software and employment of volunteers and casual staff. Fifty-three projects were identified over the five-year period. Most lacked directly measurable financial outcomes (because they were based on education, research, patient or practitioner satisfaction). The benefit of the programme has been greater to the department than suggested from cost analysis alone. Although this programme could not be justified on a simple cost recovery basis, the authors felt it to be worthy of continued support because of the non-financial benefits. However, modification is required to minimize costs.

Malgré le volume impressionnant de littérature portant sur l'assurance de la qualité (AQ), nous possédons peu d'information

Key words

ANAESTHESIA: quality assurance;
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sur les coûts et bénéfices générés par les programmes départementaux d'AQ. Sur une période de cinq ans, nous avons mesuré les coûts directs et examiné les bénéfices financiers et autres bénéfices d'un programme d'AQ financièrement bien pourvu. Les données ont été recueillies à partir des budgets départementaux, des rapports annuels du programme d'AQ et de plusieurs banques de données utilisées par le programme. Les salaires constituaient la principale composante du coût annuel moyen de 79,900\$, alors que chaque année, 14,300\$ étaient récupérés grâce aux activités reliées au programme. Les coûts étaient en réalité plus élevés que les coûts calculés parce que le temps de bénévolat offert par le personnel médical et les ressources partagées avec d'autres programmes n'ont pu être évalués. Certaines dépenses encourues lors de la mise en marche du programme ont été par la suite neutralisées par l'utilisation de logiciels commerciaux et l'emploi de volontaires et de personnel occasionnel. Cinquante-trois projets ont été identifiés pendant la période de cinq ans. La plupart de ces projets n'avaient pas d'incidence financière directe (étant basés sur l'éducation, la recherche et la satisfaction du patient ou du praticien). Le bénéfice du programme a été plus important pour le département que ne laisse croire l'analyse financière. Bien qu'on ne puisse justifier ce programme avec l'argument économique, les auteurs croient que ses bénéfices autres que financiers motivent un appui continu. Cependant, certaines modifications sont requises pour en diminuer les coûts.

In 1988, the Department of Anaesthesia at Foothills Hospital established a hospital-funded quality assurance (QA) programme. The department has a complement of 33 medical staff (24 full time equivalents) who perform approximately 21,000 anaesthetics each year. The QA programme was based on a traditional model of QA¹ with elements including: a database of anaesthetic activities of the department, derived from a previously described model;² a method for the initiation and completion of those projects required to improve the quality of care provided by the department; a system for detailed chart

review or mortality and major morbidity by a dedicated medical staff member; an educational programme for staff and residents using peer assessment and case audit in rounds; a specific educational rotation for residents;^{3,4} and a risk management system.⁵ A physician peer review mechanism, derived but extensively modified from that described by Vitez,⁶ was introduced in 1989.

Personnel included a QA coordinator, data entry clerk, and a programmer-analyst, all at different times in full or part time employment. All received specific funding for their work in QA. Medical staff, including a medical director, were involved, but were not specifically funded.

Since inception of the programme, all activities have been recorded, although monitoring expenditures or cost effectiveness of QA was not an original goal. Because recent budget cuts and development of hospital-wide quality projects will result in major alterations in this programme, we decided to review its effectiveness over the five years by examining the financial expenditures, and the financial and non-financial benefits.

Methods

Financial expenditures and financially measurable benefits of the QA programme were obtained from departmental personnel and equipment budgets. Non-financial benefits were determined from the department's QA activity records and annual reports. Once identified, specific projects were categorized as either internal or external, depending on whether the principal focus was inside or outside the department, and further divided into six subtypes. These subtypes were audit, education, quality improvement, resident, research, and risk management. This classification system was developed pragmatically, based on review of the types of projects.

Results

The financial expenditures identified over the five years are shown in Table I. The major costs were related to the employees involved. These expenditures represent salary costs without benefits, normally about 15% of salary costs, since these were not charged back to the department. Initially, the programme required approximately \$85,000 each year to meet its payroll. Once the programme was underway, manpower needs lessened, without a demonstrated decrease in the number of projects undertaken each year. No reliable estimate of the number of hours donated by medical staff could be determined.

The financially measurable benefits of the programme are shown in Table II. The largest saving was due to a change in contracts for servicing of vaporizers. The change arose from a technical quality control project and results in a major decrease in contracted services. The second major saving resulted from investigation of the

TABLE I Estimated cost of QA personnel for the five years of the QA programme and projected cost for the next financial year

Years	Personnel	Full-time equivalents	Financial resources
1-2	QA coordinator	1.0	\$84,753/year
	Data entry clerk	0.5	
	Programmer/analyst	0.6	
3-5	QA coordinator	1.0-0.67	\$74,974/year
	Data entry clerk	0.5	
	Programmer/analyst	0.6-0.5	
6	QA coordinator	0.6	\$47,673/year
	Data entry clerk	0.5	
	Programmer/analyst	0.16	

TABLE II Financially measurable benefits over the five years

Measurable benefit	Savings (\$)
In-house servicing of vaporisers (with quality control) to reduce annual external servicing costs	46,980
Rationalization of use of neuromuscular blocking agents, using database to demonstrate practice patterns of drug use and case length	16,000
Discontinuation of warming blankets based on audits of hypothermia	8,000
Consulting services	560
Total measurable benefit	71,540
	(14,308/year)

use of neuromuscular blocking agents by staff physicians. This showed that intermediate acting agents were frequently used for long cases (i.e., greater than 90 min), with consequent cost inefficiency. Using the departmental database, a physician-specific drug utilization profile was prepared and sent to each practitioner. The use of intermediate acting agents decreased sufficiently to save \$16,000 in that fiscal year. No obvious adverse effects (for example, increased reintubation rates) resulting from this change in practice were detected by analyzing the database for critical recovery room events. Unfortunately, this exercise was not repeated in subsequent years to see if additional savings could be gained. The third saving was achieved by discontinuing the use of warming blankets, although this money was redirected to other projects in subsequent years. In addition, a recent source of revenue has come from charges for QA consultations performed for other hospitals.

Non-financial benefits were represented by the projects undertaken, with a total of 53 carried out during the five years. Numbers of each of the subtypes and examples are given in Table III. The projects undertaken were diverse. Some audit-related projects monitored the introduction of new surgical procedures or services, for ex-

TABLE III Classification of non-financial benefits of the department's QA programme

<i>Outcome term</i>	<i>Definition</i>	<i>n</i>	<i>Example</i>
Audit	Data collection about individual or departmental performance	16	Computerized database to collect recovery room events
Education	Staff training	6	Development of self-guided learning module for new blood glucose monitor
Quality improvement	Projects designed to improve a process of care or support service	4	Methods to alleviate delay of entry of first case into the OR
Resident	All resident projects	12	Development of a pain scoring technique
Research	Investigation of the method or implementation of QA	7	Use of community volunteers to aid QA data collection from discharged patients
Risk management	Projects with major focus on decreasing risk to patients	8	Development of institution-wide programme for reuse of single use items.

ample, cardiac anaesthesia and laparoscopic cholecystectomy. (Other examples of projects defined as audit are shown in Table IV). Educational projects included teaching programmes for new equipment, for example, new blood glucose monitors, and continuing education programmes for nursing and support staff. Quality improvement projects related to the quality of working life of anaesthetists were also carried out, for example, noise in the OR, unnecessary telephone calls into the theatres, and availability of food at lunch time. A number of projects were classified as research, for example, evaluation of a computerized system for patient assessment and selection of laboratory tests, or evaluation of the effectiveness of hospital volunteers in QA data collection.⁶ The physician peer review programme reviewed 33 charts during its first year. By 1993, this programme was expanded to include analysis of post-anaesthesia recovery room "events," with 157 such events reviewed, as well as review of 49 charts identified by a self-reporting system. Further examples of some of the projects classified as major non-financial benefits are shown in Table V.

TABLE IV Examples of internal projects related to audit

<i>Title</i>	<i>Result</i>
Development of routine QA programme for technical support staff	Maintenance of readiness of all 24 anaesthetizing locations On-going identification of equipment requiring repair
QA programme for CV perfusion	Develop programme to ensure readiness and safety of perfusion care
Collection of all anaesthetic record data in a database	Ensure access to basic information about anaesthetic practice for purpose of research or QA
Mortality review (annual)	Determine rates and classification of mortality occurring within ten days of anaesthesia for purpose of comparison to other published results
Audit of OR environment from anaesthetic point of view	Determine aspects of OR environment of concern or irritating to anaesthetists so as to effect improvement

TABLE V Examples of major non-financial benefits

Rewriting of information about fasting instructions and medications for "admit day of procedure" patients.
Re-design of O ₂ delivery system in PARR to prevent connection of high pressure gas sources directly to endotracheal tube adaptors.
Use of information available from the database to inform practitioners of potential difficulties in their practice, resulting in, for example, reduction in PARR "airway difficulty" events.
Development of visual scale for measurement of back pain after labour and delivery.
Design and use of questionnaire to measure patient satisfaction with obstetrical anaesthesia and analgesia.
Use of questionnaire to provide better feedback from outpatients to anaesthetists.
Introduction of newsletter to ensure timely and accurate information to anaesthetists about departmental operation/policies, etc.
Development of hospital-wide QA/QI reporting system (paperless system).
Publication of six papers, abstracts and posters.

Discussion

Our objective in this study was to assess the cost-effectiveness of our departmentally-based QA programme over a five-year period by examining the invested financial resources, and both the financial and non-financial benefits. With respect to the invested financial resources, direct incremental costs due to the programme were well identified, although some information was not available for this review. For example, the number of hours given voluntarily by staff physicians for work done in directing the programme, in peer review, or on specific projects could not be determined. In addition, lesser costs may

not have been adequately counted. Most of the resources used by the QA programme were shared with other projects and required no specific additional expenditures – for example, space and computer facilities. These costs were therefore not attributed to QA.

The difference between the annual cost of \$79,900 and the demonstrated savings of \$14,300 per year is substantial. Furthermore, opportunities for financial savings became harder to find in the later years, making consistent ongoing, and future, cost recovery difficult. Nevertheless, cost efficiencies can be achieved in our (or other's) QA programme. For example, volunteers, students, and casual staff⁷ can be used whenever possible. There is evidence that data collection may be performed satisfactorily by volunteers or employees without training in health care.⁸ The use of increasingly more powerful and cheaper, commercial, computer database programmes⁹ to assemble large databases of information may present both advantages and pitfalls. It is certainly easy to accumulate large amounts of clinical information, which may be of use for quality assurance.¹⁰ However, some caution is essential to ensure that data collected for QA are well focused on the relevant issue.¹¹ Further, the presence of large databases encourages the use of generic occurrence screening in quality assessment, an approach that has been questioned because of its lack of specificity.¹² Thus, greater discipline in project selection and completion is required. An illustrative example from this programme was the attempt to judge the impact of increased use of long-acting neuromuscular blocking agents by a simple occurrence screen, i.e., the rate of reintubation in the recovery room. Substantial evidence exists that residual postoperative neuromuscular blockade is common in patients receiving pancuronium.¹³ However, re-intubation is a poor index of residual blockade. Thus, the absence of an increase in reintubation rate cannot assure anaesthetists that their change in practice was without adverse effect. Rather, an additional QA project should have been carried out to assess residual paralysis in the recovery room.

We have thus determined that our QA programme could not function on a simple cost recovery basis. Was the expense justified? In attempting to judge the cost-effectiveness of a QA programme, three questions must be considered.¹⁴ First, how much does it cost? Second, is QA effective? Third, what is the balance of costs and benefits?

First, how much does it cost? Quality assurance is required for accreditation of institutions and Royal College training programmes,* and has been adopted by national

medical organizations and large hospitals around the world.^{15,16} Quality assurance activities are also an expectation of anaesthesia departments. For example, the Guidelines to the Practice of Anaesthesia as recommended by the Canadian Anaesthetists' Society state that the chief of anaesthesia should "monitor systematically the quality of anaesthetic care provided."¹⁷ The methods employed to reach this goal vary with the resources and size of the department. At a minimum, periodic chart review and audits are required. Larger departments may have dedicated personnel and other resources. Despite these requirements, there have been few publications in the medical literature that describe simple cost, financial, or even clinical effectiveness of either departmentally or institutionally based QA programmes.¹⁸ Although QA programmes in anaesthesia departments have been described,⁴ little information is available about their costs and benefits. A literature review using *Silver Platter*® employing the search terms *quality assurance and (cost effectiveness or programme evaluation)* produced 195 citations for the period 1987–93. None of these articles described the cost-effectiveness of a QA programme at the departmental level. (In addition, in performing a literature review, we had previously failed to locate this type of information.¹⁹) Since some anaesthetic departments have made considerable financial investments in QA, this paucity of information is disturbing.

Second, is QA effective? Quality assurance has been defined as "ongoing, planned, systematic activities for monitoring and evaluating the quality of care ... and follow-up to ensure the effectiveness of the actions in continually improving the quality of care."²⁰ Information generated by QA activities is likely to be of little value if it does not produce a change in practitioner behaviour. In some circumstances, feedback of information to practitioners may be effective. For example, an isolated QA project, based on a recognized need for change in practice or on an acknowledged clinical problem, may be a useful starting point for effective QA. However, simply presenting facts to physicians has been shown to result in little change in behaviour.²²

Third, what is the balance of costs and benefits? While some have claimed that QA is in its research and development phase and requires further funding,²³ others have expressed the view that QA should be limited until its cost and medical effectiveness are proved.²⁴ "Many health professionals have criticized QA's ability to relate their activities to fiscal matters, to provide useful information to decision makers on ways to measure return on expenditures, and to demonstrate cost/benefit advantages to third party payers."²⁵ Formal analysis of cost-effectiveness requires comparison of an outcome measure (for example, cost per life-year gained) between two

*General Standards of Accreditation. The Royal College of Physicians and Surgeons of Canada. Ottawa, 1992.

"treatments."¹⁴ The diversity of goals achieved by the projects makes it unlikely that a single measure of effectiveness can be established which would allow the cost-benefit ratio to be calculated. Nevertheless, it is apparent that attention should be directed to the financial issues concerning QA programmes, if only to ensure that invested financial resources are managed wisely.

Is it possible to assess the balance of cost to benefits resulting from this programme? Many of the projects undertaken did not directly produce financially important outcomes, although some produced enhanced patient or staff satisfaction and all 53 projects undertaken produced some benefit for the department. Given the evidence of poor cost recovery, and increasing scrutiny of financial resources, programmes such as this may face an uncertain future. Also, since we lack data for a comparable department without a QA programme and do not have a single measure of outcome for the programme, proper analysis of cost-effectiveness is impossible. However, the non-financial results, reflected by the 53 identified projects, are substantial and it is our belief that, although modification is required to be most sparing of resources, this programme is indeed worth defending.

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