doctor's wife. Although our own assessments may have been biased because we knew the occupation of the patients, we should have influenced the results consistently, as we were testing the assumption that it was doctors as well as their wives who had more complications from their illnesses than one would expect. Similarly, one of our reasons for adopting this particular experimental approach was that we wished to cause as little disruption of normal ward behaviour as possible, so that the nurses did not know that their own notes had been used as a measure of behaviour. Because of these points, we think that we have observed a real difference in nursing and medical staff behaviour towards one group of their patients. Because of the limitations imposed by the design of our study, we conclude that this difference in behaviour is not related to social class, parity, race, or age, and may be related to the occupation of the patient's husband.

What is more intriguing is why the nursing and medical staff should view minor psychiatric problems so differently. In all three groups comments are duly made about unusual behaviour in the mothers, despite the different ways in which the problems arose. The way these problems were subsequently managed, however, differs. An explanation may be that the medical staff do not perceive the doctors' wife as their patient, as she has a live-in physician who will look after her and her baby. Nevertheless, her husband expects her to behave very differently from his own patients, and consequently she is effectively ignored by

everyone dealing with her emotional care.^{4 5} On the other hand, the physician-wife is hardly going to think of herself as a patient, let alone in need of medical help.^{2 3}

What is clear, however, is not that being a special patient is particularly harmful but that by not recognising this type of patient quite obvious and simple problems may be missed.

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Cost of anaesthesia

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Abstract

The major contributory factor to the cost of anaesthesia today are the increases in medical salaries that have kept pace with inflation, commanding 68% of the total expenditure. The current position has been compared with that of 20 years ago. This outline could be used as a framework for departmental budgeting.

Introduction

There have been many reports on the cost of anaesthesia over the past 20 years. Simpson¹ and Bailey² in 1978 examined in detail the price of drugs and compared and contrasted different anaesthetic techniques; they pointed out economies that could be made. Other authors^{3 4} combined the cost of drugs and staffing to give an overall cost of anaesthesia. Simpson¹ reported that despite inflation the cost of drugs had stayed fairly constant over the preceding 17 years, but it was subsequently pointed out⁵ that a "new and much larger cost is that of disposable equipment."

Shackleton³ quoted an average of £3.69 per anaesthetic in Southampton. Twenty years later the figure has risen to £29.68 in a London teaching hospital, an increase of eight times. We

have investigated the major contributing factors to the total cost of anaesthesia by considering in turn drugs, equipment and servicing, and medical and nursing staff.

Cost of drugs

The prices of drugs are based on the cost plus VAT as obtained from the hospital pharmacy at the end of 1980. All substances have been considered except liquid oxygen, as this is delivered throughout the hospital and its contribution to the cost of an anaesthetic is negligible.

The total drug bill for 1980 was £44 032. Between them nitrous oxide, thiopentone, fentanyl, and halothane accounted for 56% of this (table I). Nitrous oxide, in clinical use since 1867, still remains the largest single item on the anaesthetic drug bill. It is used instead of nitrogen to provide the non-oxygen content of each tidal volume. It is also an excellent analgesic (300-360 l/h may be used in each anaesthetic). Despite a view currently held by some anaesthetists that in the future anaesthesia will be totally intravenous, nitrous oxide will probably remain a constant ingredient in the vast majority of anaesthetics. The figure for halothane was 11.2%, compared with 37.1% in Sheffield in 1966,⁴ the fall being due partly to awareness of its potential dangers, partly to a reduction in cost from £9.96 per 250 ml when it was introduced to £6.4 per 250 ml, and partly to increased use of neurolept and local anaesthetic techniques.

Fentanyl contributed 11.5% to the total drug bill, and muscle relaxants 22.3%, as compared with 5.3% in 1966.⁴ The expense of the most recent inhalation agent, ethrane, at £28.75 per 250 ml, accounting for 4.7% of the total drug bill, should be contrasted with the price of trichlorethylene at £1.4 per 500 ml.

The current cost of anaesthesia for a major operation such as a hysterectomy (table II) lasting an hour was £3.01 when halothane was used, increased to £4.96 when fentanyl was used, but more than

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TABLE I—Cost of various drugs

Drug	1980 (£)	Total spent (£)	% of total
Thiopentone 0.5 g + H ₂ O	0.71	6523	14.8
Methohexitone 100 mg	0.47	227.5	0.5
Althesin 5 ml	1.20	1177.6	2.6
Propomid	0.44	30.6	0.1
Etomidate	1.16	577.2	1.3
Diazepam	0.24	1482.3	3.3
Pethidine 2 ml/100 mg	0.06	384.4	0.8
Pethidine 5 ml/50 mg	0.25	134.6	0.30
Fentanyl 0.2/2 ml	0.45	1616.8	3.67
Naloxone	2.47	1362.2	3.09
Pentazocine 2 ml/60	0.64	302.4	0.68
Papaveretum and hyoscine	0.07	545.7	1.23
Suxamethonium	0.39	3219.0	7.3
Curare	0.75	3803.8	8.6
Pancuronium	0.70	2272.0	5.15
Alcuronium	0.50	379.5	0.86
Gallamine	0.22	211.2	0.47
Neostigmine	0.06	254.4	0.57
Atropine	0.04	561.0	1.27
Halothane/250 ml	6.42	4945.0	11.2
Ether/500 ml	2.01	210.2	0.47
Trilene/500 ml	1.43	25.7	0.058
Enflurane/250 ml	28.75	2098.7	4.76
N ₂ O 1816 litres	3.99	8232.0	18.69

TABLE II—Cost of hysterectomy lasting one hour

	Present estimate 1980	Total	Bailey*	Total
Thiopentone	0.71		0.32	
Suxamethonium	0.39		0.18	
Pancuronium	1.14		0.52	
N ₂ O	0.30		0.28	
O ₂	0.04		0.03	
Halothane	0.30		0.23	
Atropine	0.08		0.04	
Neostigmine	0.05	£3.01	0.07	£1.67
0.5 g fentanyl instead of halothane	1.95	£4.66	0.99	£2.42
Fentanyl and naloxone instead of halothane	2.47	£7.43		
3 ECG electrodes	0.66			
Butterfly needle 23 g	0.27			
Syringes and needles	0.24	£1.17		
Intravenous drip:				£3.20
Angiocath 16 g	0.38			
Drip set	0.65			
1 litre Hartmann's solution	0.99			
Sticking plaster	0.01	£2.03		

doubled if the opiate antagonist, naloxone, was added. The cost of anaesthesia may have remained fairly constant between 1960 and 1978, but in the past two years prices have increased appreciably from £1.66² to £3.01.

Equipment and servicing

Monitoring equipment has improved so much over the past decade that it is now our routine to make use of a continuous ECG during anaesthesia. Disposable intravenous infusion equipment is also routinely used for major surgery, and it is our practice to use autoclavable red rubber tubes, which are included in the total cost under the central sterile supplies depot (CSSD) heading, that cost £5200 a year (table III).

Disposable equipment costs as much as drugs, £3.22 as compared with £3.01 (table II). It accounted for up to 51% of the cost, com-

TABLE III—Factors affecting the cost of anaesthesia

Item	1980 cost (annual)	% of total
Medical salaries	342 850	67.69
Nursing staff	86 529	17.08
ODA and SODA	6 898	1.16
Secretarial		
Equipment: disposable repairs, renewals, replacement and new items	18 000	3.55
Drugs	44 032	8.69
Central sterile supplies depot	5 200	1.03
Study leave	900	0.17
British Oxygen Company servicing	3 050	0.60
	506 459	

(S)ODA = (Senior) operating department assistants.

pared with the estimated 68% in 1978.⁵ Drip sets, cannulas, dressings, needles, etc, are provided from a separate stores budget for the whole hospital, while the anaesthetic equipment budget is separately liable for endotracheal tubes, laryngoscopes, and repair and replacement of anaesthetic and monitoring equipment; the three-monthly service contract with the British Oxygen Company also comes out of the equipment budget (table III).

The total cost of equipment, servicing the equipment, and CSSD amounts to 5% of the total budget. Depreciation is allowed for by a replacement programme and the equipment budget is uplifted for inflation annually.

Medical and nursing salaries

Medical staff salaries accounted for 61% of the total anaesthetic budget in 1960.³ The percentage has risen to nearly 70% (table III), and we have therefore calculated our session availability⁴ as follows:

Consultants 54 theatre sessions × 46 weeks	2484
Four senior registrars × 9 theatre sessions × 46 weeks	1656
Five registrars × 9 theatre sessions × 47 weeks	2115
Three SHO's × 9 theatre sessions × 47 weeks	1269
	7524

An intensive care unit commitment requires one full-time registrar covering 10 × 52 = 520 sessions, therefore total available theatre sessions = 7524 - 520 = 7004. These figures take into account annual leave, study leave, teaching sessions, and sickness as no locums are employed.

In 1980 16 227 anaesthetics were given in the whole theatre group (NHS). From this we can deduce efficiency

$$= \frac{16\,277}{7004} = 2.32 \text{ cases/session}$$

This compares favourably with the 1966 estimate⁴ for Sheffield, which worked out at 1.97 cases/session.

Medical salaries are the largest item contributing towards the cost of an anaesthetic, closely followed by nursing and operating department assistants' salaries (table III). We employ one sister, seven State-registered nurses, seven State-enrolled nurses, three operating department assistants, and two senior operating department assistants.

We have not estimated for power, heat, rates, and water, nor for any items that come under "hotel" services in district budgeting.

Total cost

The "basic" cost of an anaesthetic is common to operations carried out in either the private or NHS sectors, since both share the following facilities:

	£
Nursing staff salaries	86 529 a year
Equipment budget	18 000 „ „
Drugs	44 032 „ „
CSSD	5 200 „ „
British Oxygen Company servicing	3 050 „ „
	£156 811 „ „

In the year ending December 1980, 16 277 NHS patients and 2167 private patients were anaesthetised. The basic cost of an anaesthetic is therefore

$$\frac{156\,811}{18\,444} = £8.50$$

The additional cost for an anaesthetic in the NHS includes

	£
Medical salaries	342 850 a year
Secretarial	5 898 „ „
Study leave	900 „ „
	£349 648

The additional salary cost of an anaesthetic in the NHS is therefore

$$\frac{349\,648}{16\,277} = £21.48$$

and the total average cost £8.50 + £21.48 = £29.98.

In 1979 the figure was £22 in this hospital, and in 1959 it was estimated with overheads at £3.69.

Discussion

From the figures given it can be seen that 85% of the total budget is devoted to staff salaries. During a period of economic recession budget holders may be required to take a cut in their budget. A 2% cut would represent £10 000, and it is not possible to extract that sort of sum without reducing the numbers of staff employed.

Purely from an economic view point the Scandinavian system of employing nurse anaesthetists instead of junior doctors in our department would require 20 nursing sisters at about £6000 a year—£120 000. Our present consultant staff of seven whole-time equivalents costs £185 000 a year.

Our current bill for medical salaries is £342 850 (consultants £185 000, junior doctors £157 850) so that by employing nurses instead of junior doctors we would save £37 850, nearly equivalent to the total cost of drugs.

Functional budgeting for clinical departments will probably become the normal method by which district management teams control their overall budget. Secker Walker⁶ has indicated that this has both advantages and disadvantages, with a defined equipment budget uplifted annually for inflation comes the ability to plan and execute a rational equipment programme and is one of the major advantages of functional budgeting. It requires the approval of the district management team to transfer money between staff and non-staff headings, but our experience has been that this has not been a problem and allows a useful

degree of flexibility. Posts unavoidably vacant for a month can produce a useful saving at the end of the year to help purchase a special bit of equipment.

To be a clinical budget holder requires close attention to the control of the budget and this does take time—and is not recompensed. Furthermore, the budget holder is required to make difficult decisions on competing claims—an expensive study leave trip may be equivalent to a new ventilator.

We hope that the data provided here can help other departments negotiate for a realistic clinical budget.

We thank both the pharmacy department and the stores and supplies department for their help and Miss R Hodgson for secretarial help.

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MATERIA NON MEDICA

February 24: to the British Library to see the "Famous Books in the History of Science" exhibition

And to suffer the almost immediate frustration of it closing at 5 pm! What opportunity for enlightenment does this afford to those of us who do not live within a stone's throw of the charmed circle of Bloomsbury? The *British library*?

But still, a valuable exhibition, apparently designed to show that important scientific discoveries over the centuries (fourteenth to early twentieth, in Europe alone) have been made by people who could write so clearly that anybody, from their contemporaries to us, might follow their ideas without hindrance. Is this a valid observation, or does it demonstrate bias in the selection of works included? One point about written communication across the centuries which was clearly, but tacitly, made was that one stands to enjoy the maximum future readership by writing in the "most advanced" language available—people paused over Harvey's *De motu cordis et sanguinis* (1628), but pored over Hooke's *Micrographia: or some physiological descriptions of minute bodies made by magnifying glasses* (1665). A lesson for those of us who don't even "speak" Basic yet?

It was interesting to trace the progress of the Renaissance northwards across Europe by following chronologically the cities of publication of the works on show. The first printed one was Robertus Valturius's *De re militari* (1472) from Venice, the city which dominated the early part of the exhibition. Basle and Nuremburg then crept in, followed by Paris, Leyden, London, Prague, Edinburgh, and Frankfurt. It seemed sad that Oxford's first selected offering was Boyle's *New experiments physico-mechanical touching the spring of air* published in 1662, nearly two hundred years after the University Press came into business (1478). From the eighteenth century on London about held her own against the combined might of the German presses, other centres pretty well fading out. Was it significant or accidental that there were no papers from outside Europe?

Medicine was fairly represented. The page at which Johannes de Ketham's *Fasciculo di medicina* (Venice, 1493) was opened illustrated the origins of two pieces of university jargon: a picture of a dissection, with the students standing around while somebody got on with the cutting, a "reader" read aloud the text they were following, and a "demonstrator" actually pointed with a stick to the relevant part. I particularly enjoyed seeing the *Guildbook of the barber surgeons of York* (circa 1500) whose illustration of men of the four temperaments is so

often used to help explain the Galenic tradition. An old friend! However, I did feel it would have been valuable, if possible, to emphasise the early existence of critical medical thinking by including that "lecture note" of pre-conquest England—the *Leechbook of Bald*.—VIRGINIA ALUN JONES, research senior house officer, Cambridge.

Below-deck lecture

The idea of a conference on HMS *Belfast* intrigued me and getting to it was not difficult: a walk from London Bridge Station along Tooley Street—hardly changed since Dickens's day—to the dock on the South Bank near Tower Bridge where the cruiser is moored.

The lecture theatre, which held about 100, was intimate and the equipment simple; so nothing was likely to go wrong except that machinery projecting from the low roof provided the risk of a tall speaker being stunned as he stepped forward to the lectern. It had a typical below-deck décor, a maze of pipes and ventilation shafts. My talk, aptly as it turned out, concerned the problems of the speaker. All went well until extraneous sounds started, the rhythm being a simple *crescendo e poco a poco morendo*—soon diagnosed as the tramping of feet from groups of tourists above. Then *staccato* noises were superimposed: those of gun fire and dive bombers as small boys, clambering over an anti-aircraft gun, found the slot where 10p started a taped record of a battle of the last war—but fortunately distant and muffled because of the intervening deck. As the penultimate slide came up, a door opened and several visitors with fancy hats appeared before the audience—not, as some suggested, pre-arranged as a finale to my talk, but an accidental intrusion in mistake for the engine room or loo.

Yet I would go again to a meeting there, though preferably not during the Easter holiday. The narrow corridors provide contacts, both mental and physical, with other participants and, as is often said, meetings are for meeting people. No temptations to escape lurk nearby and it is unlikely that any talk will be so confusing as to cause a distraught listener to fling himself into the Thames. For respite from staring at slides one steps on to the deck and gazes at the superb panorama of the City of London opposite where the shapes of the dome of St Paul's, the Monument, and the Tower of London act as foils to the rectangular geometry of the skyscrapers which tower above them. —CLIFFORD HAWKINS, Birmingham.