

TABLE II Components of pre-use anaesthetic machine checklist

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Reserve cylinders
High pressure leak
Pipeline connections
Pipeline pressures
Gas flows (flowmeters)
O <sub>2</sub> Pressure failure device and alarm
– During cylinder operation
– During pipeline operation
Machine circuit leak test
– Vapourizers on
– Vapourizers off
Vapourizers – confirm off
O <sub>2</sub> Flush valve
Scavenging system
Breathing Circuit
Monitors/alarms

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d. Operator training and operator vigilance: These are likely the most important factors.

#### References

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## Monitoring anaesthetic practice

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Of the many methods of studying morbidity/mortality in anaesthesia, and thus monitoring anaesthetic practice, six will be described.

Anecdotal tales are usually reports of anaesthetic rarities, occurring at a rate of "1/?", and often bearing little relevance to day-to-day practice, e.g., "blue jumpers and pink trousers."<sup>1</sup> However, these reports may lead to more detailed studies once a problem has been identified.

In-hospital audit involves review of the written anaesthetic record, the making and keeping of which is mandatory in most parts of the world. Review is facilitated by computerisation, allowing quantification of the rates of death and other major complications although, even in the best regulated institutions, records may be incomplete or missing. Also, the low incidence of untoward events<sup>2</sup> re-

quires that a large number of procedures be carried out to allow accurate calculation of true risk of morbidity/mortality. Furthermore, anaesthetic related complications may occur in the first post-operative week,<sup>3</sup> and these are not usually noted on the anaesthetic record, nor are they always recognised. But, for the clinical anaesthetist, in-hospital audit provides the best method of self and peer monitoring.

Reports to medical protective societies are made in two situations: (1) involvement in an incident which may have potential for litigation and (2) involvement in a lawsuit. Every year the societies publish a report of "interesting cases;" in 1979, the Medical Defence Union of the United Kingdom reviewed<sup>4</sup> anaesthetic accidents during 1970-77. Of the 71 cases of cerebral damage, faulty technique was responsible for 60.6 per cent and "anaesthesiologist failure" for 4.2 per cent. This latter category was defined as "absence of the anaesthesiologist from the operating room when something went wrong with the patient," an indefensible situation.

Retrospective studies have been the major method of investigating problems with anaesthesia. However, the disadvantages are multiple: failure to record significant events at the time of occurrence, failure to store records leading to loss, a changing pattern of clinical practice, and in the case of multicentre studies which these often are, a lack of uniformity of assigned values. An example of the latter is the definition of death associated with anaesthesia. Harrison's 1978 study<sup>5</sup> defined death as "occurring during or within 24 hours of anaesthesia" and showed a frequency of 1/4537 anaesthetics whereas the Association of Anaesthetists of Great Britain and Ireland in 1982 reported<sup>2</sup> a death rate of 1/10,000 for a six-day postanaesthetic period.

Specific anaesthetic-related problems usually surface in the medical press, first in the correspondence column or as a leading article, and then, as a report of a study. An example is the National Halothane Study, which probed the problem of halothane-associated hepatitis with a retrospective study of some one million patients in 34 institutions. Only seven patients were found where the consensus was that halothane might have been responsible, an apparent incidence of 1/10,000.

Prospective studies are the best way of investigating medical problems. However, there must be a

working hypothesis and, when looking for rarities, large numbers of patients need to be studied, often requiring the expenditure of large numbers of dollars. An example of this is a multicentre study of four general anaesthetics in 25,000 patients over two years at a cost of US\$1,000,000, currently being carried out in North America.

In conclusion, there are many methods of monitoring anaesthetic practice, from peer review to international enquiry. The specialty of anaesthesia has recognised that problems exist and is making attempts to quantify these and address possible solutions.<sup>3</sup>

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## Postoperative assessment of the effects of anaesthetic agents

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In North America each year approximately 8.5 per cent of the population or 21 million patients receive general anaesthesia for surgery and 235,000 of