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Differences in Costs: How Much Can We Save?

To the Editor:—Expenses derived from purchase of anesthetic gases and volatile agents are relatively small when compared with what surgeons use; nevertheless, in the budgetary process within a department of anesthesia, if substantial savings can be accomplished and the monies retained and allocated for the purchase of other needed items, greater funds may be available for purchase of additional priorities such as monitors, gas analyzers, ventilators, *etc.*

A recently conducted survey on the costs of anesthetic items in 29 countries revealed important differences in the cost of oxygen, nitrous oxide, halothane, and enflurane.*

From data obtained in that survey, an analysis of the costs of the mentioned gases for 8 countries was made, estimating what would be spent in 1,000 h of anesthesia using oxygen (2 l/min), N_2O (4 l/min), and 1% or 2% halothane and enflurane, respectively. These figures then were compared with what was calculated as spent if minimal flows were used,[1] including 300 ml/min of O_2, 200 ml/min N_2O, and either 2% or 4% of halothane and enflurane, respectively (table 1). An estimate of the calculated cost for isoflurane in the United States also is included.

From the selective analysis depicted in table 1, it is obvious that in the United States and England, where both gases and volatile anesthetics are manufactured, the cost of these chemicals is the lowest. Having a sophisticated chemical industry, as in the case of West Germany, does not necessarily result in lower costs. In general, but not consistently, importers located at faraway distances pay higher prices.

The most striking fact is the considerable decrease in expenses resulting from using minimal flows, everywhere. One can assume that, with closed circuit, costs would be even lower. A marked difference is evident among those countries that have to pay the most. If, theoretically, one operating theater is used 1,000 h/year, the funds that could be reallocated for other purposes could be substantial in a hospital with 16 anesthetizing locations or a health system with a total of 1,200 operating rooms. The differences previously noted[2,3] have been accentuated by the prevailing economic crisis elsewhere and some of the market forces in play.

The increased use of soda lime, resulting from closed-circuit application, is comparatively insignificant.[4,5] The differences in costs cannot any longer be considered as negligable[6],† nor can they continue to be neglected by

* Aldrete JA, Hendricks PA: The cost of anesthesia: An international survey: Acta Anaesthesiol Belg, in press.

† Conway CM: Low flow and closed breathing systems. Clin Anaesth 1:275–290, 1983.

TABLE 1. Comparison of Costs of Vapors and Gases in High *versus* Minimal Flows in U.S.A. Dollars for 1,000 h of Anesthesia

	USA	England	West Germany	Japan	El Salvador	Brazil	Panama	Finland
Oxygen								
2 l/min (120 m^3)	102	78	438	180	480	282	110.4	256.8
300 ml/min (18 m^3)	15.3	11.7	65.7	27	72	42.3	16.56	38.16
Nitrous Oxide								
4 l/min (240 m^3)	576	504	3336	1176	2268	1944	684	720
200 ml/min (12 m^3)	28.8	25.2	166.8	58.8	113.4	97.2	34.2	36
Halothane								
1%	1224	936	1800	4464	4288	2304	1408	2496
2%*	204	180	300	744	1128	716.9	256.8	417.3
Enflurane								
2%	6624	6048	6480	10080	10950	5700	5625	5400
4%*	1104	1008	1080	1680	2207.9	988	975	962
Isoflurane								
1.2%	9746							
2.4%*	1624							

Bold numbers indicate the calculated costs for minimal flow rates.

* Differences in percentages are noted to compensate for the higher concentration required when lower flows are used.

either anesthesiologists, administrators, or health care systems planners. Some compelling action on this matter is due. Although these differences are important in the developed countries, they are crucial for the developing consumers.

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In Defense of Trimethaphan for Use in Preeclampsia

To the Editor:—Hood *et al.*[1] make an excellent case for the use of nitroglycerin (NTG) to attenuate the cardiovascular responses to tracheal intubation in severely preeclamptic patients. They may, however, underestimate the usefulness of trimethaphan (TMP) in this setting.

Severely preeclamptic patients may develop hypertensive encephalopathy and hemorrhage or cerebral edema.[2] Cottrell *et al.*[3] showed that intracranial pressure doubled and cerebral perfusion pressure fell 58% when NTG lowered the mean arterial pressure from 104 to 69 mmHg. Cerebral blood flow and intracranial pressure do not change during moderate TMP-induced hypotension.[4] In addition, TMP produces minimal blood–brain barrier dysfunction.[5]

Undesirable side effects of TMP listed by Hood *et al.* include histamine release, decreased cardiac output, and prolonged paralysis after succinylcholine administration. Fahmy and Soter[6] conclude that "histamine release by trimethaphan does not play an important role in the hemodynamic effects of the drug in humans."[6] They noted no decrease in cardiac output with TMP.

Poulton and James[7] reported 6 h of apnea following TMP and succinylcholine; however, they had used an enormous dose of TMP (1,700 mg). Sklar and Lanks[8] found that usual clinical doses of TMP should double the duration of action of succinylcholine. This should not present clinical problems during anesthesia for cesarean section.

In short, TMP can be a useful agent for acute blood pressure control in severely preeclamptic patients during induction and emergence from general anesthesia. The potential intracranial complications of NTG-induced hypotension are avoided.

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