ployers (the major payers of care) now restricting free choice of physician, families are losing even the basic right to choose their own health care provider.

The narrowing of individual choice is one side of the loss of patient clout in the health care system. Equally important is the issue of power that patients as a group might hold; for example, in the consumer cooperative model of health maintenance organizations (HMOs), HMO enrollees actually control the HMO governing body. As HMOs increasingly move toward investor-run for-profit organizations, the voice of the patient grows even more feeble.

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Cognitive Effects After Epidural vs General Anesthesia

To the Editor.—I read with interest the article by Dr Williams-Russo and colleagues[1] regarding cognitive effects after epidural vs general anesthesia. However, since the overall effect on cognition is certainly most profound in the first few days after an anesthetic, it would seem imperative that the medications received by patients during that first week would need to be tightly controlled, and in fact they were not. For example, the epidural group received midazolam for sedation; the general anesthetic group did not. This drug is certainly capable of producing significant cognitive impairment, particularly in elderly patients, and this should have been considered. In addition, the type of postoperative analgesia was not controlled in the study. Again, medications that are routinely given for postoperative analgesia can have significant effects on cognition, and these too should have been controlled for if valid conclusions were to be drawn regarding the anesthetic technique as the only variable.

The final criticism has to do with the conclusion, which states "the type of anesthesia, general or epidural, does not affect the magnitude or pattern of postoperative cognitive dysfunction or the incidence of major cardiovascular complications in older adults undergoing elective total knee replacement." Yet in the body of the article the conflicting statement is made that "the power of this study to detect a [clinically important difference] in cardiovascular complications is too low to reach a definitive conclusion on the relative risk of epidural vs general anesthesia for this outcome." The benefits of regional anesthesia and analgesia, particularly in the elderly population, are significant, and I am therefore concerned, not so much for what the article says as for what it implies and concludes based on a study design that is capable of doing neither.

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1. Williams-Russo P, Sharrock NE, Mattis S, Szatrowski TP, Charlson ME. Cognitive effects after epidural vs general anesthesia in older adults: a randomized trial. *JAMA.* 1995;274:44-50.

In Reply.—Dr Witt raises several important issues that we took into account during the original design of our study protocol. The first issue concerns systematic differences in medications given in conjunction with the anesthetic agents in both the operative and immediate postoperative periods that could potentially affect outcome. These medications included intraoperative sedatives and postoperative analgesics. The types, routes, and quantities of these medications were systematically different between the epidural and general anesthesia groups. Thus, these other medications were cointerventions that were associated with the type of anesthesia received.

We did not attempt to equalize the use of these adjunctive medications between the two anesthesia protocols for several reasons. First, we preferred to emulate customary clinical practices to ensure the generalizability of the results rather than strive for a "cleaner" comparison of the anesthetic agents alone. The use of intravenous midazolam and fentanyl for sedation is common during epidural anesthesia, while the use of fentanyl or other narcotics plus thiopental sodium for induction of general anesthesia is common practice. Similarly, it would be unusual to administer postoperative analgesia through the epidural rather than parenteral route to a patient who had received general anesthesia. Second, our primary outcome of interest was long-term cognitive function. We concur with Witt that there is without question a profound difference in the level of consciousness in the immediate postoperative period between epidural and general anesthesia, but that was not the outcome under study. Based on multiple studies in the regional anesthesia literature comparing the effects of different sedatives and the pharmacodynamics of these agents, we would not expect intraoperative sedatives such as midazolam to have any residual effect at either 1 week or 6 months after surgery. With regard to postoperative analgesia during the first 2 to 3 days after surgery, we had previously performed and published a study specifically looking at the impact of epidural vs intravenous analgesia after bilateral total knee replacement.[1] We found no differences in the rate of delirium or change in cognitive performance between the two forms of analgesia within the first week after surgery.

With regard to Witt's final comments, we agree, as stated in the article, that the power of the study is too low to reach definitive conclusions about postoperative cardiovascular complications taken as an isolated outcome. This would require a very large, multicenter randomized trial. However, we can state that when looking at the combined occurrence of either cognitive or cardiovascular complications, no significant difference was observed between the two types of anesthesia in our predominantly elderly population, with a power of greater than 99%. Again, as we stated, there may be other reasons to choose one type of anesthesia over another for an individual patient. Indeed, the majority of lower extremity joint replacement procedures at our institution are currently performed under epidural anesthesia. Regional anesthesia offers many potential advantages, but when used for major surgical procedures, it cannot be considered as low risk as local anesthesia relative to general anesthesia. As new techniques are introduced into practice in medicine, it is crucial to perform rigorous comparative outcome studies.

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1. Williams-Russo P, Urquhart B, Sharrock NE, Charlson ME. Postoperative delirium: predictors and prognosis in elderly orthopedic patients. *J Am Geriatr Soc.* 1992;40:759-767.

CORRECTION

Incorrect Tuition and Required Fees.—In Appendix IA, Table 1 of the September 6, 1995, Medical Education issue of THE JOURNAL (1995;274:747), the tuition and required fees for Dartmouth Medical School are cited incorrectly. For 1994-1995, the cost is $25 920 for residents and nonresidents.

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