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Prologue: Nurses and physicians have a long history of cooperation and conflict in carrying out their respective roles on behalf of the patient. This relationship has evolved in a variety of settings and over a multitude of issues that sometimes bind and sometimes divide the interests of these medical care professionals. In this context, one of the more difficult relationships revolves around the delivery of anesthesia services. The American Association of Nurse Anesthetists (AANA) persuaded that a series of developments in recent years indicate the American Society of Anesthesiologists (ASA) and its physician members are actively attempting to eliminate the position of certified registered nurse anesthetist (CRNA) and gain full control of the practice of anesthesia. The ASA, of course, flatly rejects this assertion. In this article, researchers Jerry Cromwell and Margo Rosenbach address some of the central economic questions around the payment of anesthesia services. They amplify these issues in a DataWatch on anesthesia practice patterns, on page 118. Both of these papers derived from a study the authors undertook for the Health Care Financing Administration (HCFA). HCFA is in the process of creating a fee schedule under which Medicare will pay all CRNAs, as directed by Congress in the Omnibus Budget Reconciliation Act of 1986. Currently CRNAs are usually on salaries and do not bill Medicare directly for the anesthesia services they provide. Under the new fee schedule, CRNAs must accept assignment in all instances. Cromwell, who holds a doctorate in economics from Harvard University, is vice-president of the Center for Health Economics Research, a Boston-area based research organization that analyzes and evaluates federal health programs. Rosenbach holds a doctorate in social science research from Brandeis University. She has concentrated on the study of anesthesia and a range of other physician payment issues in her time at the center.
Public interest in reforming Medicare payments to physicians has increased markedly in recent years. This has been in response to unprecedented growth in Part B outlays, 43 percent between 1983 and 1986, even though physicians’ fees were frozen during most of this period under the Deficit Reduction Act (DEFRA) legislation. Besides the fee freeze, Congress enacted numerous changes in Part B reimbursement as part of its Omnibus Budget Reconciliation Act (OBRA) 1987 legislation, including payment rollbacks on twelve “overpriced” procedures, only a 1 percent update for nonprimary care physicians’ services, and a mandate for the secretary of health and human services to develop fee schedules for radiologists and pathologists. Anesthesiologists also received attention; their base units for reasonable charges were reduced on concurrent procedures involving nurse anesthetists. Congress also required three studies of anesthesia reimbursement, in addition to a previously mandated study of nurse anesthetist reimbursement (DEFRA 1984).

Besides the general concern over physician cost inflation, there are other reasons why policymakers ought to consider seriously reforming anesthesia payments under Medicare. In 1985, the average anesthesiologist reportedly earned $140,200, up from $57,100 ten years earlier. This 145 percent growth far exceeded the doubling in physician incomes more generally. Increased work effort can explain part of the gap, but the average hourly income for anesthesiologists in 1985 was $56.37, fully $10 per hour higher than for the average physician. And while the Consumer Price Index (CPI)-deflated incomes of physicians fell 7.2 percent on an hourly basis over the past decade, imputed hourly incomes of anesthesiologists outperformed the CPI by 7.5 percent. Such performance was particularly good in light of an 11 percent decline in real hourly earnings of other workers.

One possible explanation for the increase in anesthesiologists’ incomes is the 28 percent increase in surgeries between 1975 and 1984, from twenty million to nearly twenty-six million. Yet, over this same period, anesthesiologist supply rose 54 percent, resulting in a significant increase in the number of anesthesiologists per 10,000 operations (from 5.6 to 6.7). Why, then, have members of this specialty done so well financially compared to their peers in medicine and to workers at large, when greater competition should have driven down fees and incomes?

The answer, we feel, lies primarily in a series of flaws embedded in third-party reimbursement methods, coupled with an inability of patients about to undergo surgery to shop around for a lower-cost anesthetist. Neither hospitals nor surgeons, who might act as the patient’s agent, have any financial incentive to negotiate lower-cost anesthesia because
anesthesiologists are self-employed and bill patients and third parties directly. Consequently, any productivity gains in providing anesthesia accrue to practitioners rather than being shared with patients and insurers as in a normally competitive market. The productivity gains are potentially large given the broad possibilities for delegation to a close substitute in the form of nurse anesthetists.

In this article, we first summarize the way in which anesthesiologists are reimbursed by third-party insurers. We then show how delegation to nurse anesthetists enhances physician productivity at higher rather than lower cost to society. We conclude with three suggestions for anesthesia reimbursement reform.

### Reimbursing For Anesthesia

The way in which third parties such as Medicare pay for anesthesiologists' services is quite different than for surgical services. For each anesthetic (that is, operation), a payment formula is applied that begins with preestablished base units reflecting the difficulty of the particular procedure; extra modifier units are added for a difficult case; finally, one time unit is added for every fifteen minutes that the patient is under anesthesia. Anesthesiologists, unlike surgeons, get paid more for longer operations of the same difficulty because the length of surgery is out of their control. The sum of all of these units then is multiplied by each anesthesiologist's allowable conversion factor to arrive at a payment rate.

A ninety-minute gall bladder operation, for example, on a seventy-year-old patient could be worth seven base units, with one extra unit for the patient's age, plus six time units. Using a typical $20 conversion factor, the anesthesiologist would get paid $280, or $187 on an hourly basis, assuming no time with the patient before or after the operation (which we consider later).

This effective hourly rate is typically only one-quarter to one-third what Medicare pays the surgeon per hour. Why then are anesthesiologists' incomes within 10 percent of surgeons' on average? Two very important facts set the anesthesiologist apart from the average surgeon. The first has to do with procedure volume. The average surgeon will perform between 250 and 500 surgeries per year compared to 1,000 to 1,300 for anesthesiologists. By the nature of their practice, surgeons provide many other services in their offices, for which they are paid much less per hour than for surgery. Anesthesiologists, however, perform many more operations day in and day out. What they lose per hour in the operating room they make up on volume. And unlike surgeons, they do not actually have to provide an anesthetic to receive reimburse-
ment. By simply being available to provide monitored anesthesia for lens extractions and other procedures, they are paid the full amount even if anesthesia is never required or if it is administered by the surgeon.

Anesthesiologists also differ from surgeons in another important way in that they can be in two, three, or even four places at once. By delegating many of the induction and intraoperative tasks to certified registered nurse anesthetists (CRNAs), they can supervise several procedures simultaneously.

How do they get paid for supervising rather than administering the anesthetic and then monitoring the patient themselves? If the CRNA happens to be in their employ (over one-third of all CRNAs work for anesthesiologists), anesthesiologists are paid by Medicare and other insurers as if they provided and monitored the anesthetic entirely alone. If the CRNA is paid by the hospital, Medicare divides the anesthesiologist’s time units in half, but not the base or modifier units, resulting in an hourly rate of $220 for this example.

Delegation To CRNAs

Opportunities for delegation of tasks to CRNAs are crucial to the productivity and incomes of anesthesiologists. To determine the actual as well as the potential range of task delegation, or the assignment of “hands-on” as distinct from legal responsibility, we recently completed a national random survey of over 1,000 anesthesiologists and CRNAs. Exhibit 1 shows that half or more of CRNAs, when working in hospitals with anesthesiologists (see column 1) said they usually or always performed the various pre- and postoperative tasks, for example, evaluating risk factors or discussing anesthesia care plans with the patient. One-quarter to one-third said they also usually administered regional blocks and inserted arterial lines. Rarely did they insert central venous pressure lines or Swan-Ganz catheters, but these are complicated tasks that are sometimes delegated as well. According to our survey of providers, in 18 percent of the 4,000 operations, CRNAs worked directly with the surgeon without any anesthesiologist supervision, in which case they reported nearly always performing the pre- and postoperative tasks and
Exhibit 1
Percentage Of CRNAs Usually Or Always Performing Anesthesia Task a

<table>
<thead>
<tr>
<th>Anesthesia task</th>
<th>Hospitals employing Both anesthesiologist and CRNAs</th>
<th>CRNAs only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluate risk factors</td>
<td>46.2%</td>
<td>95.8%</td>
</tr>
<tr>
<td>Discuss anesthesia plan with patient</td>
<td>57.0</td>
<td>93.9%</td>
</tr>
<tr>
<td>Evaluate patient in recovery</td>
<td>40.1</td>
<td>89.8</td>
</tr>
<tr>
<td>Administer regional blocks</td>
<td>26.3</td>
<td>65.3</td>
</tr>
<tr>
<td>Insert arterial lines</td>
<td>35.8</td>
<td>57.0</td>
</tr>
<tr>
<td>Insert central venous pressure lines</td>
<td>14.4</td>
<td>56.9</td>
</tr>
<tr>
<td>Insert Swan-Ganz catheter</td>
<td>4.1</td>
<td>44.7</td>
</tr>
</tbody>
</table>

*aCertified registered nurse anesthetists (CRNAs) reported how often they usually or always performed the task when it was required.

over half usually administering regional blocks (see column 2). This is partly explained by the key role nurse anesthetists play in emergency surgery when anesthesiologists are unavailable.

Of course, the bulk of the delegation occurs during the operation itself when mostly routine monitoring is required. In longer operations, this can amount to 80 percent or more of the total anesthesia time, freeing up large blocks of time for the anesthesiologist to supervise other CRNAs, see other patients in preparation for surgery, or plan the next day’s schedule.

Further evidence of the high degree of substitution of CRNAs for anesthesiologists is the similarity of procedure complexity for supervising versus solo anesthesiologists. If CRNAs could be used only on routine surgeries, the procedure complexity level of solo anesthesiologists would be much higher. Exhibit 2 gives the twenty most frequently reported surgeries and their average complexity level using the sum of base and modifier units. By including modifier units, we simultaneously account for both procedure and patient severity. Although patient severity can add significantly to overall complexity on individual cases, its effect is nominal for most procedures. Patient modifiers, for example, add 0.3, or 10 percent, on average to the average breast biopsy complexity score. For hernia repairs, the add-on is 15 percent.

The distribution of complexity scores is essentially identical for team versus solo anesthesiologists: 5.84 and 5.86, respectively. Note in particular the similar frequencies for coronary artery bypass surgery and complicated artery/vein procedures. Also note the high percentage of very simple cases that the solo anesthesiologist does alone, say, those whose total complexity score is less than four.
## Exhibit 2
Top Twenty Procedures By Type Of Anesthesia Provider

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Average complexity</th>
<th>Anesthesiologist and CRNA</th>
<th>Anesthesiologist only</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent of total</td>
<td>Cumulative percent</td>
<td>Percent of total</td>
</tr>
<tr>
<td>Breast biopsy</td>
<td>3.3</td>
<td>1.9%</td>
<td>-</td>
</tr>
<tr>
<td>Dilation and curettage</td>
<td>3.4</td>
<td>4.2%</td>
<td>6.1%</td>
</tr>
<tr>
<td>Knee arthroscopy</td>
<td>3.7</td>
<td>3.4%</td>
<td>9.5%</td>
</tr>
<tr>
<td>Cystoscopy</td>
<td>3.9</td>
<td>3.6%</td>
<td>13.1%</td>
</tr>
<tr>
<td>Vaginal delivery</td>
<td>4.1</td>
<td>1.5%</td>
<td>14.6%</td>
</tr>
<tr>
<td>Myringotomy</td>
<td>4.6</td>
<td>0.9%</td>
<td>15.6%</td>
</tr>
<tr>
<td>Hernia repair</td>
<td>4.7</td>
<td>3.8%</td>
<td>19.4%</td>
</tr>
<tr>
<td>Tonsillectomy</td>
<td>5.0</td>
<td>2.2%</td>
<td>21.6%</td>
</tr>
<tr>
<td>Cataract procedures</td>
<td>5.1</td>
<td>6.2%</td>
<td>27.9%</td>
</tr>
<tr>
<td>Laparoscopy</td>
<td>6.0</td>
<td>4.2%</td>
<td>32.1%</td>
</tr>
<tr>
<td>Appendectomy</td>
<td>6.1</td>
<td>1.0%</td>
<td>33.1%</td>
</tr>
<tr>
<td>Caesarean section</td>
<td>6.1</td>
<td>4.6%</td>
<td>37.7%</td>
</tr>
<tr>
<td>Hysterectomy</td>
<td>6.2</td>
<td>4.1%</td>
<td>41.8%</td>
</tr>
<tr>
<td>Transurethral resection of prostate</td>
<td>6.3</td>
<td>2.5%</td>
<td>44.2%</td>
</tr>
<tr>
<td>Bronchoscopy</td>
<td>6.9</td>
<td>0.9%</td>
<td>45.1%</td>
</tr>
<tr>
<td>Cholecystectomy</td>
<td>7.7</td>
<td>3.0%</td>
<td>48.1%</td>
</tr>
<tr>
<td>Laminectomies</td>
<td>9.1</td>
<td>2.1%</td>
<td>50.2%</td>
</tr>
<tr>
<td>Major joint procedures</td>
<td>10.8</td>
<td>1.9%</td>
<td>52.1%</td>
</tr>
<tr>
<td>Artery/vein procedures</td>
<td>11.2</td>
<td>2.2%</td>
<td>54.3%</td>
</tr>
<tr>
<td>Coronary artery bypass graft</td>
<td>21.8</td>
<td>1.6%</td>
<td>55.9%</td>
</tr>
<tr>
<td>Residual</td>
<td>-</td>
<td>44.1%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>


*Average complexity refers to the average number of base units plus modifiers assigned to the selected procedures. One unit was added if the patient was over sixty-nine years of age. Another one, two, or three units were added if the patient’s ASA status was three, four, or five. Average complexity is not presented for the residual procedures because of the wide range of procedures included in this category.

A final piece of “large-scale” evidence for substitution is the systematic, offsetting variation in anesthesiologist and CRNA availability across states. California, Oregon, and Massachusetts, for example, have above-average numbers of anesthesiologists (as well as other physicians), while Alabama, Michigan, Mississippi, and Nebraska have disproportionately more CRNAs and fewer anesthesiologists.13 (See related DataWatch: “Anesthesia Practice Patterns.”) Assuming that the same kinds of surgery are being performed across the country, such a disparate anesthesia provider mix does not appear to be a serious constraint.

**Impact on productivity.** The impact of delegation to CRNAs on anesthesiologists’ productivity is demonstrable. According to our survey (Exhibit 3), the typical solo anesthesiologist provided anesthesia for 3.7 patients per shift compared to 5.3 to 6.5 patients when working with
CRNAs. Using total base, modifier, and time units as the accepted measure of anesthesiologist output, the gain to supervision ranges between 34 and 63 percent, allowing for downtime and some nonconcurrent procedures. Longer shift times of team anesthesiologists explain about half of this difference, but supervision may extend the working capacity of the physician during the day, and the larger gains may be closer to the true gain from delegation after all.

**Impact on costs.** With a close substitute available for the delegation of both routine and complicated tasks, one of two things should happen in a competitive market. First, reimbursement per hour worked should converge if the costs of training were similar. As shown by the annual incomes of the two providers, that is not the case. Anesthesiologists earned $140,000 in 1985 compared to $41,000 in 1984 for the average CRNA, a 3.4-to-1 difference.\(^{14}\) The gap is less on an hourly basis, but it is still 2.3 to 1. Hence, the economic savings from substitution are large.

Second, large hourly income disparities in a market where substitution is high still can be maintained if there are a few critical periods that require the presence of the more skilled worker. In the case of anesthesia, these might be the more delicate induction period and when emergencies occur during the operation. Yet, in spite of the delegation possibilities, the number of anesthesiologists is already high and growing rapidly. Between 1975 and 1986, their numbers grew 69 percent compared to only 31 percent for CRNAs.\(^{15}\) As of 1986, there were 18,956 practicing anesthesiologists in the United States versus 22,529 CRNAs, implying one full-time anesthesiologist for every 1.2 CRNAs. By 1996, this ratio is projected to fall to 1:1.\(^{16}\) In spite of broad substitution possibilities, many anesthesiologists are working alone (28 percent according to our survey).\(^{17}\)

The annual cost to society of limited delegation, not to mention to insurers such as Medicare, is difficult to estimate. A rough guess would
assume an ideal ratio of two CRNAs for every anesthesiologist.\textsuperscript{18} This would result in a very different provider mix than currently exists. Instead of the roughly 19,000 and 22,500 anesthesiologists and CRNAs that we have now, the more economically efficient numbers would be 14,000 and 28,000, respectively. If we currently had such a mix, the annual savings would approach $840 million based on each provider’s annual income. Although a two-to-one mix may not be feasible in every small rural area, these figures indicate the kinds of gains possible by reversing current trends.

Interestingly, the Graduate Medical Education National Advisory Committee (GMENAC) reviewed the initial forecasts and assumptions and felt that the CRNA supply and the team care concept were not growing fast enough to justify a two-to-one ratio. Given the continued widespread use of CRNAs in small towns and large teaching hospitals throughout the country, we can only conclude that reimbursement methods are systematically biased against the team approach to anesthesia, at substantial cost to society.

Impact on quality. Naturally, policymakers are concerned about the impact of CRNA use on anesthesia outcomes and quality of care. The available evidence suggests that anesthesia outcomes are not adversely affected by CRNA involvement.\textsuperscript{19} When CRNAs worked alone or with anesthesiologists, there were no significant differences in anesthesia mortality. This is not the same as saying that CRNAs are as well-trained or qualified to deliver anesthesia as anesthesiologists under all circumstances, only that patient outcomes are not any worse when CRNAs are involved. Because the literature is not definitive on this issue, further research is needed. However, the fact that CRNAs are involved in the most complex surgeries, often in major teaching hospitals, is \textit{prima facie} evidence of the perceived quality of their services in the eyes of surgeons and anesthesiologists. Moreover, institutional mechanisms, such as standards for CRNA supervision, hospital accreditation, professional licensure and certification, continuing education, and quality assurance programs, contribute to the quality of anesthesia care delivered by both groups.

**Explaining Anesthesiologist Overpayments**

Solo anesthesiologists. Let us now bring together our reasons why the current reimbursement system overpays solo anesthesiologists as well as those who supervise CRNAs. First, regarding anesthesiologists who choose to work alone in the operating room, we estimate that Medicare is paying them on the order of $125 per anesthesia hour, including an extra
half hour for pre- and postoperative consultation. This rate approaches $200 per hour on more complicated surgeries. Hospital-employed CRNAs, by contrast, are paid less than $25 per hour, or $40 loaded. Even on minor anesthetics such as dilation and curettage, circumcision, excision of heel, breast biopsy, and knee arthroscopy, anesthesiologists are effectively paid over $100 per hour. These are anesthetics that trained CRNAs could (and often do) perform with little or no supervision from an anesthesiologist. If we valued the CRNA at the hospital-loaded $40 hourly rate and assumed that a supervising anesthesiologist could oversee three routine procedures at a time, the effective anesthesia cost could be reduced by one-third, that is, $40 + [.33 X $125] = $81 versus $125. Also note that if the CRNA worked directly under the surgeon, the effective cost would be $40, or one-third the solo anesthesiologist rate.

Why are such expensive anesthesiologists allowed to practice such low-productivity medicine while being paid at rates triple that of a close substitute? In a normally competitive industry, personal preferences to practice alone would be permitted only so long as suppliers accepted the lower market price when treating routine cases. But the market for anesthesia is far from normal. There is no incentive for hospitals to hire lower-cost CRNAs to replace expensive anesthesiologists because anesthesiologists are rarely under hospital salary. Billing third parties such as Medicare directly, anesthesiologists are a “free good” to hospitals and surgeons, who naturally have every incentive to use them where they are available. The same is true of patients who rarely choose their anesthesia provider—that choice is made by the surgeon and hospital. Anesthesiologists naturally respond to the lack of market competition by setting high fees to maximize third-party reimbursements. As Medicare prevailing charges are predicated on stated fees, payments even to nonsupervising anesthesiologists generate high hourly rates of remuneration.

This also explains why so few anesthesiologists accept Medicare assignment. There is practically no competitive advantage or pressure to compete on price. Anesthesiologists usually are assigned patients as a condition of their hospital contract and have little incentive to forgo balance billing for fear that the patient will not return for more care in the future. Besides, most beneficiaries have supplemental insurance that covers any deductibles and copayments and enables them to contribute toward a balance bill.

Supervising anesthesiologists. Not only are solo anesthesiologists overpaid relative to a close substitute, they remain overpaid even when they supervise. This results from a flaw in the payment mechanism that pays them their full rate when they employ CRNAs and (until recently) only diminishes their time units (by 50 percent) when CRNAs are hospital
employed. As a rough rule, base and modifier units together equal the reimbursable time units on a typical operation. Thus, halving only their time units lowers anesthesiologist payment per operation by only 25 percent while the number of operations doubles or triples, depending on how many are done concurrently.

In recognition of this problem, Congress recently amended the Medicare provisions for paying anesthesiologists by reducing the base units by 10, 25, or 40 percent depending on whether two, three, or four operations were being concurrently supervised. This was done regardless of who employed the CRNA.

Although these changes are in the right direction, their cost savings are likely to be minor. First, assuming a fifty-fifty, base-time unit split, these reductions are cut in half, percentage-wise, in terms of physician net payment. At most they are effecting only a 20 percent cut, and then only for the very rare anesthesiologist supervising four operations simultaneously. The average reduction will be no more than 5-10 percent per operation, leaving the supervising anesthesiologist with several hundred dollars more per shift than a solo practitioner.

What is the rollback in absolute dollars? The typical solo anesthesiologist receives about $250 per operation from Medicare. After allowing for the ninety minutes that the typical anesthesia takes plus another thirty minutes pre- and postoperatively, this translates into $125 per hour or $1,250 per ten-hour shift. Supervising eight procedures over six hours (two procedures concurrently) with another four hours of pre/postoperative care and allowing for $300 in total CRNA wages (two CRNAs for six hours at $25 per hour), the anesthesiologist’s hourly rate jumps to $170, or $1,700 per shift. For three procedures, the effective hourly income rises to $212, and for four procedures to $245, or $2,450 for a ten-hour shift, net of CRNA costs.

After the congressional cutbacks, the anesthesiologists’ new effective hourly income becomes $160 for two procedures, and roughly $180 per hour for three or more procedures. Whereas the four-procedure supervising anesthesiologist used to enjoy an hourly rate double that of his solo colleague, now it is only about 50 percent higher. Keep in mind, however, that for the same ten-hour shift, this difference amounts to $550 for anesthesiologists supervising four procedures concurrently.

Further evidence of overpayments. From this discussion of payment methods, it would appear that third-party payers set anesthesiologists' allowable fees higher than necessary to compensate them equitably and efficiently for the effort involved. Through a rate-of-return-to-schooling analysis, Frank Sloan and Joel Hay provide additional evidence that anesthesiologists may be overpaid. According to their calculations, an
Anesthesiologists enjoyed a 22 percent return to each year of medical school and residency training, adjusting for length of training, medical school costs, and resident stipends. This rate is significantly greater than for all physicians (16 percent) and even surgeons (19 percent) and radiologists (20 percent). It is also more than double the rate earned by the typical college graduate.

Thus, it would appear that either anesthesiologists are paid too much per hour given the availability of a less expensive, close substitute, or if they are paid a fair amount for their specialized training there are far too many in practice, or both. Because no national policy exists governing anesthesiologists’ incomes or supplies, the system is driven by a flawed reimbursement method that permits expensive anesthesiologists to (1) work alone on routine cases at high hourly rates, and/or (2) supervise CRNAs and bill as if they were the only provider. In fact, the current Medicare system permits anesthesiologists to set up a “supervisory” practice in hospitals where CRNAs had been working alone with the surgeon at much lower cost to the program. As anesthesiologist competition grows, supervisory overlaying will become more common, and Medicare and other third parties will pay essentially triple what they had been paying for the same anesthesia services.

Some Inadequate Solutions

Reducing base units under supervision, as was done in OBRA 1987, will address the problem only partially. The law will affect only a small number of providers with little program savings, and the effective hourly incomes of supervising anesthesiologists will remain high, both in absolute dollars and relative to that of nurse anesthetists. Finally, if supervision is penalized, it might discourage team anesthesia, which is more efficient in using valuable, highly trained resources.

Another “solution” that will have limited impact is the OBRA 1986 provision permitting CRNAs to bill Medicare directly beginning in 1989. Under this provision, the CRNA cost passthrough for hospitals will end, and nurse anesthetists will begin direct billing for their services under Medicare Part B unless employed by an anesthesiologist. Greater competition between the two providers, however, is unlikely. This is because patients rarely choose their anesthetist but are usually assigned one depending upon the hospital’s contract arrangements and the surgeon’s preferences. As under current Part A and B reimbursement policy, anesthesiologists and nurse anesthetists will remain free inputs to the hospital and the surgeon, who should increasingly opt for the more skilled anesthesiologists as they become available.
Nor do we believe that price competition from patients offers any hope of constraining costs. Through Medicare and supplemental insurance coverage, elderly beneficiaries are sheltered against large out-of-pocket payments. While it is true that anesthesiologists regularly balance bill patients, which is not covered by insurance, these bills are more of a surprise after the operation than an *ex ante* price that enters the patient's choice of anesthetist. Hence, it is unreasonable to expect patients to negotiate anesthesiologist fees up front or to shop around. Flawed reimbursement methods, compounded by a basic market failure due to insurance and patient ignorance of fees, call for a basic restructuring of third-party payment.

**Real Policy Solutions**

**Hospital-based anesthesia services.** We would suggest three more fundamental solutions to redress the related problems of anesthesiologist overpayments and personnel misallocations. One solution would be to redefine anesthesiologist services as hospital-based, much like pathologist services are now under Medicare. Pathologists are paid a fixed salary for the bulk of their time spent administering the hospital lab. Anesthesia costs also could be folded into the diagnosis-related group (DRG) rate and paid to the hospital under Part A. Administrators then would have a strong incentive to purchase anesthesia services efficiently. The primary objection to this solution is that anesthesiologists usually interact with patients even when supervising CRNAs, unlike pathologists, who completely delegate lab testing to technicians.

**Anesthesia DRGs.** A second solution would involve constructing "anesthesia DRGs" that would pay a single fixed amount per operation for anesthesia, either to the hospital or to the medical staff, regardless of provider mix. This is slightly different from the first suggestion in that payment would be technically separated from Part A of Medicare and earmarked for anesthesia providers. Even if payment went to the medical staff rather than the hospital, incentives to adopt the team approach would remain unless the entire staff were willing to subsidize anesthesiologists working alone or if solo anesthesiologists were willing to accept lower payments.

So-called "physician DRGs" have been criticized because they involve too much risk if payment is made to individual physicians. Two changes would mitigate this risk. First, by paying the hospital or the medical staff instead of the individual anesthetist, all physicians could pool the risk of systematic triage of difficult cases. Anesthesiologists assigned the "tougher" cases could be paid a bonus based on contract arrangements
with the institution or the medical staff. Second, instead of using DRGs, a separate amount could be paid under Part B of Medicare based on an average cost per anesthesia complexity group. The ASA’s relative value scale (RVS) could be used to aggregate procedures into complexity groups. Thus, a three-unit anesthetic might cost $60 on average; a four-unit procedure, $70; and a twenty-one unit coronary artery bypass, $1,000 for the anesthesia. An anesthetic-specific severity adjustment would be a major improvement over the current DRGs.

**Scaling back the conversion factor.** A third solution would be to regard anesthesia as an overpriced procedure much as Congress did in OBRA 1987 for a few surgical procedures. Limited steps have been taken already in this direction by reducing anesthesiologists’ allowable charges for cataract surgery and supervision. Conversion factors could be scaled back even further to what a CRNA plus a reasonable amount of anesthesiologist supervisory time should cost. The Health Care Financing Administration (HCFA) has been mandated by Congress to study conversion factors and is expected to report its findings by January 1989.

HCFA also has a congressional mandate to develop a physician RVS, which gives the agency the opportunity to realign anesthesia base units to reduce the effective hourly rate of anesthesiologists working alone and encourage more efficient team care. Given the CRNA’s ability to carry out essentially all of the tasks on routine anesthetics, an expert panel could develop a weighting scheme for nurse and physician time by complexity group. This scheme could produce an index of relative input requirements that could then be used to modify the current Medicare anesthesia units and produce more spread in reimbursement. Tinkering with the anesthesia RVS may be unnecessary, however, if lowering the conversion factor had similar effects on incentives to delegate routine procedures.

Lowering the conversion factor also could address concerns over the lack of anesthesiologists in rural areas by reducing the return to working alone in urban areas. Any maldistribution of anesthesiologists should not be solved by raising the reimbursement bridge in rural areas, but rather by lowering the reimbursement river in overdoctored cities. With an annual net income in excess of $140,000 and a rate of return to specialization exceeding 20 percent, it seems extravagant for society to be offering extra bonuses to anesthesiologists to relocate. In any case, unless some real reform is initiated soon, the opportunity to achieve an efficient anesthesiologist/CRNA mix could be lost, program outlays will remain unnecessarily high, and another occupation providing valuable care at low cost will be put on the endangered list.
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NOTES

2. Ibid.
3. The AMA data on hours worked per week show a sharp upward break of 15 percent post-1980 after a secular decline for many years. This is attributed to a change in reporting and not to a real increase in work effort. Thus, our $56.37 estimate is probably understated by a comparable percentage.
4. Changes in patient care physicians' hourly incomes based on AMA data are biased downwards due to the change in the way weekly hours were collected after 1980. If the post-1980 hours are adjusted for this break, both the all-physician and anesthesiologist imputed real hourly rates are positive: 7.2 and 29 percent, respectively.
5. The 11 percent real decline is based on average hourly earnings of production and related workers in private industry excluding agriculture (U.S. Census Bureau, Statistical Abstract, 1987, Table 676), deflated by the Consumer Price Index (Table 774).
8. The average surgeon’s reported net income was $155,000 in 1985 versus $140,000 for anesthesiologists; see Gonzalez and Emmons, Socioeconomic Characteristics of Medical Practice 1986, Table 39.
9. Average surgeon volumes based on the mean of 7.1 surgeries reported per week in Gonzalez and Emmons, Socioeconomic Characteristics of Medical Practice 1986, Table 18, multiplied by average weeks worked, Table 4. Anesthesiologist volume is based on a special survey of anesthesiologists conducted by the authors.
11. The $25 loaded CRNA hourly wage is based on a 15 percent add-on to the reported average wage of anesthesiologist-employed CRNAs. The calculation is based on unpublished data from the AANA Fiscal 1986 Membership Survey.
14. Unpublished data based on AANA Fiscal 1986 Membership Survey. CRNA incomes are gross and include vacation, sick, and bonus payments. Anesthesiologists income are net of all practice costs. The figures should be quite comparable in terms of discretionary income.
16. Based on our forecasts of residency, training enrollments, and aging of the two provider stocks. For details, see Rosenbach et al., Payment Options for Non-Physician Anesthetists, 3-17-19.
17. This figure represents the percentage of anesthesiologists working in hospitals without CRNAs. According to our survey, 33 percent of cases involved a solo anesthesiologist.
18. M. Bowman et al., “Estimates of Physician Requirements for 1990 for the Specialties of


20. This rate is well below the $187 cited earlier in the text for a gall bladder operation primarily because the half hour time before and after the operation, we have assumed, raises anesthesiologist time by one-third from one and a half to two hours. Any remaining difference is due to the fact that the typical operation is not quite as complicated as is gall bladder surgery.

21. See note 11.

22. A 67 percent loading factor is based on the typical hospital markup on CRNA services (based on inquiries by a past president of the AANA). This loading is far higher than the 15 percent assumed when anesthesiologists employ the CRNA, but they do not have all the hospital overhead to cover.

23. According to HCFA data, only 51 percent of anesthesiologists' bills were accepted on assignment, compared to 63 percent for all physicians.


25. M. Rosenbach et al., *Payment Options or Non-Physician Anesthetists*, Table 8-8.

26. Note that the hourly rate for a ten-hour shift does not double with concurrent supervision because of the assumption that only the anesthesiologist performs the pre- and postoperative exam. Were we to assume that these tasks were also partially delegated, the rate would jump to $206 per hour for an eight-hour shift.

27. F. Sloan and J. Hay, "Alternative Medicare Pricing Mechanisms for Physicians’ Services," unpublished paper prepared for Project HOPE Center for Health Affairs under HCFA Grant No. 18-C98567/301, 30, Table 1.
