Special Article

A Critique of the Practice-Expense Values of the Resource-Based Relative Value Scale

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The resource-based relative value scale (RBRVS) was implemented by the Health Care Financing Administration on January 1, 1992. The practice-expense payments from the old Medicare fee scale were moved unchanged into RBRVS. This resulted in underpayment of office-based practice expenses and overpayment of hospital-based practice expenses. For example, office visits are underpaid by $10.28, whereas coronary angiograms are overpaid by $123.00.

Unpaid practice expenses reduce the after-expense physician-work fee of the average office visit by about one half, yet overpayment of practice expenses for some hospital procedures almost doubles the after-expense physician-work fee for some subspecialties. Inflation will likely increase the actual practice expense of the average office visit to the point that the after-expense physician-work fee for the family physician will be reduced to zero by the year 2001.

Key words. Relative value scales; fees and charges; practice management, medical; inflation, economic; Medicare, US Health Care Financing Administration.
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Physician payment reform was mandated by Congress in 1986.[1] In response, the Health Care Financing Administration (HCFA) implemented the resource-based relative value scale (RBRVS) on January 1, 1992. Relative value units (RVUs) were established for physician work, practice expense, and malpractice insurance expense. The RVU for each is multiplied by a conversion factor (CF), and the products are added together to calculate the total payment for a medical service.

HCFA's practice-expense RVUs result in severe underpayment for primary care office-based expenses and, conversely, gross overpayment for hospital-based practice expenses. The RBRVS imperils primary care services because inflation will increase the practice expenses of the average office visit to the point that the after-expense physician-work fee will be reduced to zero by the end of the decade. In this paper, the RBRVS and its components are explained and actual cost comparisons are made.

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Components of the Resource-Based Relative Value Scale

The following formula is used in the RBRVS to determine the total payment for a medical service:

[Physician-Work RVU × CF] +
[Practice-Expense RVU × CF] +
[Malpractice Insurance RVU × CF] = Total Payment

To understand the flaw in the RBRVS, one must first understand from where each of its components was derived.

Relative Value Units

The physician-work relative value units (RVUs) are the result of a meticulous study by a team of economists headed by William Hsiao, PhD.[2–4] Hsaio's investigation supports the assertion that one physician-work RVU for any service is equal to one physician-work RVU for any other service, or the same service performed by any other specialty.

Many physicians assume incorrectly that Hsiao also

developed the practice-expense RVUs. Although named the resource-based relative value scale, the practice-expense valuations of the RBRVS are not resource-based, but were derived from the 1991 Medicare fee scale. Each practice-expense RVU was calculated by multiplying the 1991 national Medicare average payment by an *expense share factor*. The expense share factor is the weighted average of the average expense shares of the specialties that perform a service (eg, colposcopy). The weight assigned to each specialty is the percentage of the number of services performed by the specialty relative to the total number of services provided by all specialties.[5] The data used to calculate the expense share factor were taken from an American Medical Association (AMA) socioeconomic survey.

Under the RBRVS, one practice-expense RVU of any service is not equal to one practice-expense RVU of any other service or specialty. No one at HCFA or in Hsiao's group has adequately shown that practice-expense RVUs are equal between different services. The research necessary to do this has, in fact, never been done.

Although inflation increased 37% from 1984 to 1992,[6] the practice-expense payments, which have been essentially frozen since 1984, were incorporated into the RBRVS without any adjustments or compensation for past or future inflation. The result is that practice-expense payments determined by the RBRVS do not reflect actual expenses.

The malpractice insurance RVU is calculated in a similar manner to the practice-expense RVU. The malpractice insurance RVUs were determined by adding a weighted average of malpractice expense shares for the specialties performing each service.

The total RVU for a given service is calculated in the following manner:

Physician-Work RVU + Practice-Expense RVU + Malpractice Insurance RVU = Total RVU

Conversion Factors

In the RBRVS, each relative value unit (RVU) is multiplied by a conversion factor (CF).[5] HCFA established the CF for medicine as $31.249 and the CF for surgery as $31.962 for 1993.[7] HCFA imposes geographical variations on the CF; therefore, local payments may differ from the payments calculated here.

Methods of Calculation

For the purpose of comparing the practice expenses calculated using the RBRVS with those of the AMA survey, the author first determined the practice-expense ratio and the physician-work ratio for the RBRVS.

Practice-Expense Ratio

The *practice-expense ratio* is that percentage of the total payment for a medical service that must be spent on overhead necessities such as nonphysician employee wages, office rent, supplies, and equipment. The author used the following formula to calculate the practice-expense ratio:

$$\frac{\text{Practice-Expense RVU} + \text{Malpractice Insurance RVU}}{\text{Total RVU}} = \text{Practice-Expense Ratio}$$

The practice-expense ratios of major specialties as determined by the AMA socioeconomic survey of 1989[8] are given in Table 1 along with the expense ratio for RBRVS, as calculated by the author.

As demonstrated in Table 1, the RBRVS expense ratios for primary care specialties (family medicine, pediatrics, and general internal medicine) are significantly lower than the expense ratios determined by the AMA survey. Furthermore, the RBRVS expense ratios that differ from the survey ratios by 10% or more tend to be inversely proportional to the expense ratios determined by the AMA survey.

The problem stems from HCFA not using actual practice expenses to assign the practice-expense RVUs of RBRVS. Instead, HCFA merely multiplied the average 1991 Medicare practice payment by an average expense share for the specialties performing the service.

Physician-Work Ratio

The *physician-work ratio* is the opposite of the expense ratio. The physician-work ratio is the percentage of total income that remains after expenses, typically referred to as net income. The author used the following formula to calculate the physician-work ratio:

$$\frac{\text{Physician-Work RVU}}{\text{Total RVU}} = \text{Physician-Work Ratio}$$

Relationship of Practice-Expense Ratio to Physician-Work Ratio

The practice-expense ratio relates to the physician-work ratio in the following manner:

Practice-Expense Ratio + Physician-Work Ratio = 1

Table 1. Differences Between the AMA Survey and the RBRVS* Expense Ratios for Representative Services Performed by Major Specialties

Specialty and Service CPT Code	AMA Survey Practice-Expense Ratio, %	RBRVS Practice-Expense Ratio, %	Difference, %
Family practice E/M 15 min 99213	55.6	41.0	−14.6
Pediatrics E/M 25 min 99214	52.3	37.5	−14.8
Internal medicine E/M 40 min 99215	49.4	36.8	−12.6
Gastroenterology† Colonoscopy biopsy 45380	40.3	56.4	+16.1
Cardiology† Coronary angiogram 93546-26‡	40.3	60.3	+20.0
Gynecology Total hysterectomy 58150	47.8	47.3	−0.5
General surgery Mastectomy 19240	41.6	43.7	+2.1
Cardiovascular surgery† 3V CABG arterial 33535	48.1	60.7	+12.6
Orthopedics† Total hip 27130	48.1	64.0	+15.9
Radiology Chest x-ray 71020-26‡	32.6	33.3	+0.7
Psychiatry Interview 90801	29.0	25.8	−3.2
Emergency medicine Detailed 99284	24.7	31.2	+6.5

**The expense ratios for RBRVS were calculated by the author using the following formula:*

[Practice-Expense RVU + Malpractice Insurance RVU]/Total RVU

†The AMA survey listed one expense ratio for all medical subspecialties and one for all surgical subspecialties. These ratios are assigned here to cardiology and gastroenterology, and cardiovascular surgery and orthopedics, respectively.
‡The CPT modifier "-26" indicates that the technical component of the service (modifier "-TC") is paid separately.
AMA denotes American Medical Association; RBRVS, resource-based relative value scale; CPT, current procedural terminology; E/M, evaluation and management; 3V CABG, three-vessel coronary artery bypass graft; total hip, total hip arthroplasty.

It is easy to see that if the practice-expense ratio is disproportionately large, the physician-work ratio becomes disproportionately small, as the two ratios must always equal 1. If practice expense were based only on the physician-work RVU and the specialty-expense ratio, it would be more accurate, but still flawed (see discussion below).

Calculating More Accurate Figures for Comparison

For this comparative study, the author estimated what practice-expense fees actually are based on using the expense ratio from the 1989 AMA survey and the RBRVS physician-work fees. The RBRVS physician-work fee was the product of the physician-work RVU times the CF.[5] For this comparison, the total fee was determined by dividing the RBRVS work fee by the work ratio (see formula below). The work ratio was calculated by subtracting the expense ratio from 1.

$$\frac{[\text{RBRVS Physician-Work RVU} \times \text{CF}]}{[1 - \text{AMA Survey Practice-Expense Ratio}]} = \text{AMA Survey Total Fee}$$

Then, as shown in the following formula, the total fee multiplied by the expense ratio yielded the expense fee.

$$\text{AMA Survey Total Fee} \times \text{AMA Survey Practice-Expense Ratio} = \text{Estimate of Actual Practice-Expense Fee}$$

Specialties for which practice-expense fees (including malpractice insurance expenses) differed greatly between the RBRVS[5] and those of the AMA survey are listed in Table 2. The physician-work fee remained the same in both methods of calculation. Under both methods, the total fee was the sum of the physician-work fee and the expense fee. The total fee for the service is different for each method of assigning expense payments because the expense fees are different.

Actual Practice Expenses Compared

The RBRVS practice-expense fees for the coronary artery bypass graft (CABG) and the average office visit, excluding malpractice insurance, are $1276.34 and $11.87, respectively. Thus, the primary care office must serve more than 100 patients to receive the same practice-expense reimbursement that the cardiovascular surgeon's office receives for one patient. An average primary care office visit (CPT 99213) typically requires 15 minutes of face-to-face physician care, as stipulated in *Physicians' Current Procedural Terminology*.[9] Thus, 100 visits require approximately 25 hours of physician time and 30 or more office-operating hours (three fourths of a 40-hour work week). Furthermore, the RBRVS stipulates that a significant part of office-based care (preparing medical records, calling patients) is nonbillable. However, these essential aspects of patient care are billable for hospital-based services.[9] Furthermore, the primary care office must prepare 100 times as many insurance forms, and each form is subject to having errors, being rejected, and being resubmitted.

For the surgical office to perform a comparable service, the postoperative CABG patient would have to

Table 2. Differences Between Practice-Expense Reimbursements Assigned by the AMA Survey and the RBRVS

Specialty and Service CPT Code	AMA Survey Practice-Expense Fee, $	RBRVS Practice-Expense Fee, $	Difference, $	Difference, %
Family practice E/M 15 min 99213	23.09	12.81	−10.28	−44.5
Pediatrics E/M 25 min 99214	33.58	17.81	−15.77	−47.0
Internal medicine E/M 40 min 99215	47.90	26.87	−21.03	−43.9
Gastroenterology* Colonoscopy biopsy 45380	86.49	165.93	+79.44	+91.8
Cardiology* Coronary angiogram 93546-26†	98.72	222.49	+123.77	+125.4
Cardiovascular surgery* 3V CABG arterial 33535	901.39	1504.77	+603.38	+67.0
Orthopedics* Total hip 27130	566.96	1088.95	+521.99	+92.1

**The AMA survey listed one expense ratio for all medical subspecialties and one for all surgical subspecialties. These ratios are assigned here to cardiology and gastroenterology, and cardiovascular surgery and orthopedics, respectively.*
†The CPT modifier "-26" indicates that the technical component of the service (modifier "-TC") is paid separately.
AMA denotes American Medical Association; RBRVS, resource-based relative value scale; CPT, current procedural terminology; E/M, evaluation and management; 3V CABG, three-vessel coronary artery bypass graft; total hip, total hip arthroplasty.

be seen 100 times during the designated 90-day surgical follow-up period.[5]

The Overpayment of Practice Expenses for Hospital-Based Services

Typically, one global fee is charged for surgical procedures, which includes payment for the actual surgical procedure and all postoperative care. Follow-up visits are not billed separately, but are part of the surgical fee. To define the exact period covered by global procedural fees, HCFA assigned follow-up periods of 0 to 90 days for each surgical procedure in RBRVS.[5]

The colonoscopy (CPT 45380) and the angiogram (CPT 93546-26) listed in Table 2 both have surgical periods of 0 days.[5] By assigning the colonoscopy and angiogram a surgical period of 0 days, HCFA has stipulated that, unlike the CABG, follow-up visits must be billed separately. Both the colonoscopy and angiogram are typically done in the hospital or ambulatory surgical center. Therefore, the physician does not incur expenses for use of the facilities or employees, for which the hospital charges the patient in a separate statement. Hence, the only expense the physician incurs is the cost of billing for the service. Office-based service is not a component of these procedures. In effect, RBRVS states that $153.12 be paid for the services of filling out the Medicare form and billing the patient for a colonoscopy (CPT 45380), and that $207.49 will be paid for performing these services for an angiogram (CPT 93546-26).

Another example of an exclusively hospital-based service is the instrumentation portion of a spinal arthrodesis (CPT 22842). HCFA allows $813.38 to cover the expenses incurred to bill Medicare and the patient. This amount is in addition to the physician-work fee and the fee for the arthrodesis procedure. The actual cost incurred in billing for these services is approximately $12, about the same amount as the total payment RBRVS allows for an average office visit ($11.87).

Some justify high practice-expense fees by viewing the overpayment as reimbursement for physician fees that they are unable to collect. In the case of the angiogram, the physician-work reimbursement is $146.25. Medicare reimbursement policy guarantees that 80% of this amount will be reimbursed by simply submitting a Medicare insurance form. This leaves the physician at risk of losing only $29.25 if the patient does not pay his 20% share. The practice-expense reimbursement fee of $207.49 more than covers the cost of filling out the Medicare form and the $29.95 in uncollected patient charges.

The subspecialty physician's office may be open during the time the physician is providing services in the hospital, and therefore, the reimbursement of office practice expenses may seem appropriate. However, this expense is obviated by efficient practice arrangements in which the physician shares an office with an associate.

Hence, when one surgical subspecialist spends a day in the operating room in the hospital, the other is holding clinic in the office. Therefore, the office and staff expenses are borne by the second physician's charges for office care. In such an arrangement, scheduling patients for the absent first physician is simply incorporated into the other office duties. Therefore, to receive payment for office expenses on the first physician's hospital-based services in excess of a small fee for billing is a double payment.

The Underpayment of Office Technical Expenses

In contrast, the practice-expense reimbursement for a procedure performed in the office, where the physician incurs clinical facility and employee costs, may be the same as the practice-expense payment to the physician's office when the procedure is done in the hospital, where the only expenses incurred are the costs of billing. Colonoscopy with biopsy, a procedure that is commonly done in the hospital, is comparable to sigmoidoscopy with biopsy, which is commonly done in the physician's office. The main differences between the procedures are that the colonoscope is longer than the sigmoidoscope and colonoscopy requires that the patient be anesthetized. However, if the procedure is done *outside* the office, the practice-expense reimbursement is $55.62. Ambulatory surgical centers are also allowed to bill Medicare for clinical facility costs (CPT 45331-SW) and receive $303.80 in reimbursement.[10] If the procedure is done *in* the office, however, HCFA allows exactly the same amount ($55.62) for practice expenses, and there is absolutely no additional reimbursement (much less $303.80) for technical expenses incurred.

In effect, HCFA has assigned a value of $303.80 for the technical costs of performing this procedure, yet excluded physician offices from receiving this amount. The actual cost to perform this technical service in the office is probably less than $100. Therefore, instead of encouraging the provision of efficient office-based services at one third of the surgical center's cost, HCFA's reimbursement scale forces the physician out of office-based practice and into more expensive surgical-center or hospital-based practice.

Inequitable Practice-Expense Payments for Different Specialties

Even if there is no qualitative difference in the technical expense incurred for an office-based procedure, HCFA allows payment for the technical expense of a subspecialty procedure, but denies payment for the technical expense of a primary care procedure.

For most minor surgical procedures, there is a specific technical component. A technician must prepare a tray of sterile instruments or clean and disinfect an endoscope. When the procedure is done in the hospital, the patient is billed separately by the hospital for expenses incurred. Rather than allowing a physician's office to bill for the technical expense of the preparation of a sterile tray as the hospital does, HCFA instituted a policy of including technical expenses in the professional fee, but *with significant exceptions for subspecialty office-based procedures.*

HCFA allows payment for technical assistance in preparing a sterile tray for outpatient subspecialty procedures such as colonoscopy[11] (CPT 45380) and bone marrow aspiration (CPT 85095). There is no qualitative difference, however, in the technical process of preparing sterile instruments for a bone marrow aspiration vs a skin biopsy, or in the disinfection of a colonoscope vs a sigmoidoscope.

HCFA cuts the practice-expense payment in half for primary care procedures that are done in the hospital. Some procedures, such as a skin biopsy (CPT 11100), are listed with an asterisk in the local Medicare fee schedule[12] (not in the *Federal Register*[5]). The asterisk indicates that if the procedure is done in the hospital, then the practice-expense reimbursement is cut in half.

Compare the practice-expense reimbursement of primary care procedures with reimbursement of subspecialty procedures done in the hospital. For the average office visit (CPT 99213), the ratio of practice-expense allotment (including malpractice insurance) to total fee is 41%. For a skin biopsy done in the office (CPT 11100), the ratio of practice expenses is 40%. If the same biopsy were done in a hospital, the practice-expense ratio would be 22%. A coronary angiogram done in the hospital, however, has a practice-expense ratio of 60% because it is a subspecialist procedure. Therefore, for procedures performed on exactly the same outpatient basis at the hospital, there is a threefold difference in the rate of reimbursement for the primary care skin biopsy as compared with the subspecialty coronary angiogram. The only practice expense to the physician in each case is the cost of billing for the service.

There is no evidence that the practice expenses for minor surgical procedures done in the office were studied in any way by HCFA. Although technical expenses for minor surgical procedures done in the office were billable under the old Medicare fee scale, it appears this practice was arbitrarily discontinued by HCFA and no subsequent adjustment in the total practice-expense fee was made.

Table 3. After-Expense Physician-Work Fees Determined by Subtracting AMA Survey Expense Ratio from the Physician-Work Payments of RBRVS

Specialty and Service CPT Code	RBRVS Physician-Work Fee, $	AMA Survey Practice-Expense Difference, $	After-Expense Work Fee, $	Change, %
Family practice E/M 15 min 99213	18.44	−10.28	8.16	−55.7
Pediatrics E/M 25 min 99214	30.62	−15.77	14.85	−51.5
Internal medicine E/M 40 min 99215	49.06	−21.03	28.03	−42.9
Gastroenterology* Colonoscopy biopsy 45380	128.12	79.44	207.57	+62.0
Cardiology* Coronary angiogram 93546-26†	146.25	123.77	270.02	+84.6
Cardiovascular surgery* 3V CABG arterial 33535	972.6	603.38	1575.98	+62.0
Orthopedics* Total hip 27130	611.75	521.99	1133.74	+85.3

**The AMA survey listed one expense ratio for all medical subspecialties and one for all surgical subspecialties. These ratios are assigned here to cardiology and gastroenterology, and cardiovascular surgery and orthopedics, respectively.*
†The CPT modifier "-26" indicates that the technical component of the service (modifier "-TC") is paid separately.
AMA denotes American Medical Association; RBRVS, resource-based relative value scale; CPT, current procedural terminology; E/M, evaluation and management; 3V CABG, three-vessel coronary artery bypass graft; total hip, total hip arthroplasty.

The Effect of Inequitable Practice Expenses on Physician-Work Fees

While anomalous RVUs have a significant effect on actual practice expenses, their effect on physician-work payment is even more extreme. The physician-work fees paid by RBRVS and the amount of change in the physician-work fees after the underpayment or overpayment of practice expenses based on the AMA survey are listed in Table 3. The physician-work fee is the physician-work RVU times the CF.[5] The after-expense work fee is the sum of the physician-work fee and the underpayment or overpayment of practice expenses.

The average office visit (CPT 99213) allows a physician's work fee of $18.44, but, based on the AMA survey, *underpayment* for practice expenses reduces this to $8.16, which reflects a 56% loss. For a total hip arthroplasty, the *overpayment* of practice expenses inflates the physician work fee from $611.75 to $1133.73, which is an overpayment of 85%.

Taking into account the underpayment or overpayment of practice expenses, a CF can be calculated for converting the work RVUs into after-expense compensation. The RBRVS stipulates that HCFA's CF multiplied by the physician-work RVUs yields the physician-work fee.[5] Analogously, the after-expense CF multiplied by the RBRVS physician-work RVUs yields the after-expense work fee. The after-expense CF can be calculated by dividing the after-expense physician-work fee by the physician-work RVUs. For example, the after-expense work fee of the average office visit is $8.16 and the work RVU is 0.59,[5] resulting in a CF of $13.83, which is 56% lower than HCFA's CF of $31.25. Conversely, the actual after-expense CF for a total hip arthroplasty is $59.23, which is 85% more than HCFA's CF of $31.96. HCFA's CF and after-expense CF are given in Table 4.

The after-expense CFs reveal the dramatic effect that anomalous practice expense fees have on annual physician income. For the average 15-minute office visit (CPT 99213),[9] the work RVU is 0.59.[5] Multiplying this by 40 billable hours per week for 50 weeks per year yields an annual output of 4720 physician-work RVUs. This output reflects that the physician worked approximately 50 to 60 hours per week to achieve 40 billable hours. For an annual output of 4700 physician-work RVUs, HCFA's CF specifies that the primary care physician should be paid $147,000, exclusive of practice expenses. But, based on the AMA survey findings, unpaid practice expenses reduce the physician's actual compensation to $65,000 per year. For the same 4700 work RVUs earned performing total hip arthroplasties, the overpayment for practice expenses increases the orthopedist's annual pay rate from $150,000 to $278,000. While the face-to-face physician time for 4720 physician work RVUs in average office visits is estimated as 2000 hours, the subspecialist can perform 4720 work RVUs in one half or one third of this time. The annual income specified by HCFA's CF,

Table 4. Comparison of HCFA Conversion Factors and After-Expense Conversion Factors

Specialty and Service CPT Code	HCFA CF, $	After-Expense CF, $
Family practice E/M 15 min 99213	31.25	13.83
Pediatrics E/M 25 min 99214	31.25	15.16
Internal medicine E/M 40 min 99215	31.25	17.86
Gastroenterology* Colonoscopy biopsy 45380	31.25	50.63
Cardiology* Coronary angiogram 93546-26†	31.25	57.7
Cardiovascular surgery* 3V CABG arterial 33535	31.96	51.79
Orthopedics* Total hip 27130	31.96	59.23

**The AMA survey listed one expense ratio for all medical subspecialties and one for all surgical subspecialties. These ratios are assigned here to cardiology and gastroenterology, and cardiovascular surgery and orthopedics, respectively.*
†The CPT modifier "-26" indicates that the technical component of the service (modifier "-TC") is paid separately.
HCFA denotes Health Care Financing Administration; CF, conversion factor; CPT, current procedural terminology; E/M, evaluation and management; 3V CABG, three-vessel coronary artery bypass graft; total hip, total hip arthroplasty.

Table 5. Annual Income for 4700 Physician-Work RVUs Based on HCFA Conversion Factors and After-Expense Conversion Factors*

Specialty and Service CPT Code	HCFA Work Income,† $	After-Expense Income, $	Change, %
Family practice E/M 15 min 99213	147,000	65,000	−56
Pediatrics E/M 25 min 99214	147,000	71,000	−52
Internal medicine E/M 40 min 99215	147,000	84,000	−43
Gastroenterology† Colonoscopy biopsy 45380	147,000	238,000	+62
Cardiology† Coronary angiogram 93546-26‡	147,000	271,000	+85
Cardiovascular surgery† 3V CABG arterial 33535	150,000	243,000	+62
Orthopedics† Total hip 27130	150,000	278,000	+85

**See Table 4 for after-expense conversion factors (CFs). The CFs were multiplied by 4700 to calculate the after-expense income.*
†The AMA survey listed one expense ratio for all medical subspecialties and one for all surgical subspecialties. These ratios are assigned here to cardiology and gastroenterology, and cardiovascular surgery and orthopedics, respectively.
‡The CPT modifier "-26" indicates that the technical component of the service (modifier "-TC") is paid separately.
RVU denotes relative value unit; HCFA, Health Care Financing Administration; CPT, current procedural terminology; E/M, evaluation and management; 3V CABG, three-vessel coronary artery bypass graft; total hip, total hip arthroplasty.

the after-expense CF, and the difference are listed in Table 5.

The research by Hsiao[1] determined that one physician-work RVU for any service by any specialty is equal to one physician-work RVU of any other specialty or service. For equivalent physician work, the total hip arthroplasty pays at a rate more than four times the compensation to primary care physicians on an *after-expense* basis. Or, inversely, the primary care physician must perform four times as many work RVUs to earn the same after-expense payment that a subspecialist is paid for a total hip procedure. Thus, the equality in payment for physician-work RVUs is essentially canceled out by anomalous reimbursement of practice expenses.

There is a vast difference between Hsiao's plan for RBRVS and HCFA's implementation of RBRVS. In general, the changes in compensation under HCFA's RBRVS are only one third or one half of the changes needed, according to Hsiao's research. For the average office visit, Hsiao recommended a reimbursement increase of 42%, but HCFA increased it by only 15%. For a total hip arthroplasty, Hsiao recommended a decrease in reimbursement of 44%, but the RBRVS change was a 16% decrease in 1992, with additional decreases to be made in subsequent years. The 1991 average Medicare allowable fee and the 1992 RBRVS fee for some services[13] are listed in Table 6. The percentage change between the 1991 fee under the old Medicare scale and the 1992 fee under RBRVS is contrasted with the percentage change stipulated from Hsiao's studies on physician compensation.[14] The major difference between Hsiao's RBRVS and HCFA's RBRVS is the anomalous practice-expense RVUs assigned by HCFA.

The 15% increase in payment for the average office visit includes an adjustment for the interpretation of an electrocardiogram (ECG). Electrocardiograms are interpreted primarily by family physicians, internists, and cardiologists. Under the old Medicare fee scale, the interpretation was payable as part of a total ECG service, but under RBRVS it is not. By explicit policy, HCFA excludes ECG interpretation from reimbursement. In order to be reimbursed for ECG interpretation done as part of an evaluation and management visit, HCFA increased the CF by 1.3% (personal communication, Dan Johnson, manager of reimbursement issues, American Academy of Family Physicians, March 3, 1993). Many physicians assume that only the evaluation and management codes were adjusted for ECG interpretation. The CF, of course, applies to all services. Therefore, HCFA allows $0.39 for ECG interpretation done during an average office visit, but $22.10 for ECG interpretation for a patient having hip arthroplasty—payment made to

Table 6. Actual Changes in Total Payments Resulting from Implementation of RBRVS Compared with Changes Recommended by Hsiao et al*

Service and 1991 Medicare Code and/or CPT Code	1991 Average Payment, $	1992 RBRVS Payment, $	Actual Change, %	Change Suggested by Hsiao et al, %
E/M Level 3 90060/99213	26	30	+15	+42
E/M Level 3 90070/99214	39	45	+15	+84
CABG 33512	3178	2726	−14	−66
Total hip 27130	2105	1772	−16	−44
TURP 52601	981	824	−16	−40
Cataract removal 66984	1342	1151	−14	−56

**Changes recommended by Hsiao et al are from reference 14 listed at end of this article.*
RBRVS denotes resource-based relative value scale; CPT, current procedural terminology; E/M, evaluation and management; CABG, coronary artery bypass graft; total hip, total hip arthroplasty; TURP, transurethral resection of the prostate.

an orthopedist, a specialist who does not even provide this service!

The Effect of Inflation on Practice Expenses

The practice expenses of physicians, like most other items in the nation's economy, are subject to inflation. The costs of nonphysician employee wages, rent, equipment, and supplies all increase at the rate of general inflation or higher. Because HCFA failed to address inflation's effect on practice expenses, inflation, coupled with HCFA's anomalous practice-expense RVUs, turns the RBRVS into a prescription for the demise of primary care.

The RBRVS assigns an expense ratio of 41%, or $11.87, for an average office visit (CPT 99213), whereas the average expense ratio for family practice is actually 55.6%, or $23.09. Including the physician's work fee, the total reimbursement HCFA allows for an office visit is $31.25. Therefore, 74% of the total reimbursement ($23.09) goes for practice expenses and is thus subject to inflation. With relatively fixed total payments, the physician's work fee must go down as inflation causes practice expenses to go up. Given the current relationship, for every 1% increase in inflation, the physician-work fee will decrease by about 3%. As inflation takes its toll over a few years, the after-expense physician-work payment (ie, net income) will be reduced to zero.

Calculating expenses based on the 1992 RBRVS CF and RVUs for the average office visit (CPT 99213),[15] the total payment was $31.00. Based on the AMA expense ratio, practice-expense costs were $22.52. This left $8.48 for the physician-work fee. For 1992, inflation was exceptionally low at 3%.[6] Inflating the $22.52 by 3% yields an expense of $23.20 for 1993. However, HCFA increased the total payment for all medical services by only 0.8% for 1993.[8] Thus, the total payment for an office visit increased to $31.25, but the after-expense physician-work fee decreased from $8.48 to $8.05, a 5.1% *loss* from the previous year.

Inflation has an entirely different effect on services with low practice expenses. The total hip arthroplasty (CPT 27130) has an RBRVS expense ratio of 64%, or $1088.95. The expense ratio based on the AMA survey of 48.1% is $566.95 (the actual expense is probably even lower). Using the conservative estimate of the AMA survey, 33% of the RBRVS total fee goes for practice expenses. For every 1% increase in inflation, the physician-work fee goes down only 0.5%. Based on the 1992 CF and RVUs, the payment for a total hip arthroplasty was $1696.63 and the practice-expense fee was $565.70, which yields an after-expense work fee of $1130.93. Inflation of 3% increases the expenses to $582.67 for 1993. The total fee would increase by 0.8% to $1710.20, and the after-expense work fee to $1127.53, which is only $3.40 less than the prior year (a 0.3% loss). Compare this with the 5.1% loss in after-expense work fee for the average office visit for 1993. There is a 17-fold difference in effect on after-expense compensation.

For the average office visit, every 4% increase in inflation must be compensated by a 3% increase in the total payment in order for the after-expense work fee to remain unchanged. Under the same economic condi-

Table 7. Effect of a 5% Annual Inflation Rate on a Primary Care Physician's and a Subspecialist Physician's Income from 1993 to 2001 Given the Current 0.8% Annual Increase in Total Reimbursement

	AMA Survey Practice Expense, $	RBRVS Total Fee, $	After-Expense Work Fee, $	Annual Income, $ for 4700 Work RVUs	Change, %
E/M Level 3 office visit					
1993	23.09	31.25	8.16	65,000	
2001	34.11	33.31	−0.81	−6,400	−110
Total hip arthroplasty					
1993	566.96	1700.70	1133.74	278,400	
2001	837.66	1812.64	974.98	239,400	−15

AMA denotes American Medical Association; RBRVS, resource-based relative value scale; RVUs, relative value units; E/M, evaluation and management.

tions, however, the after-expense payment for a total hip arthroplasty would increase by 1.7%.

The projected effects of inflation on the after-expense compensation of the average office visit and a total hip arthroplasty from 1993 to the year 2001 are given in Table 7. A projected inflation rate of 5% was used. The payment for the average office visit increased by 0.8% per year (the same increase for 1993). The total hip arthroplasty was increased by the same 0.8%. Based on these calculations, by 1996, when the RBRVS is fully implemented, the annualized after-expense physician-work fee based on average office visits will have fallen from $67,500 in 1992 to $42,000, a 37.8% loss. By the year 2001, the entire amount paid for the average office visit will be required to pay for practice expenses, and the after-expense physician-work fee will be zero. Conversely, under exactly the same economic conditions, the annualized physician-work fee based on total hip arthroplasties decreases about 2% per year, so that by the year 2001 the total compensation would be only 15% lower than in 1993.

Discussion

In HCFA's RBRVS, there is no defined relationship between the physician-work values and the practice-expense values. If HCFA calculated the practice-expense RVUs on the basis of the physician-work RVUs and the average expense ratio from the AMA survey (as the author has done here), then the practice-expense values would be defensible as "resource-based" (but still flawed). The result of combining resource-based physician-work values with anomalous practice-expense values is disastrous. These two different methods of assigning payments resulted in a relationship between physician-work and practice-expense values that varies in a haphazard and irrational manner between different services by different specialties.

Under the RBRVS, there is little semblance of economic reality as illustrated by an expense ratio of 40% for a primary care office visit. No average primary care clinic in the country can provide office services at this unrealistically low rate of reimbursement for practice expenses. In fact, one half of the family practice offices in the country exceed the 1989 national average practice-expense ratio of 55%.

The expense ratio of 40% reflected in the RBRVS implies that if physicians refused to subsidize clinic overhead, the majority of primary care offices in this country would be bankrupt. At present, about one half of every RBRVS physician-work dollar reimbursed goes to keeping the office doors open. Most health insurance companies base reimbursement on the RBRVS; therefore, the inequities discussed here apply to almost every insurance-reimbursement check as well as every Medicare check.

Conversely, the RBRVS overpays the practice expenses of hospital-based procedures. A reasonable estimate of the practice costs of hospital-based services is the practice-expense share for emergency medicine. By definition, emergency medicine is carried out entirely in a hospital emergency department. However, the practice-expense share for emergency physicians is 24.7%.[8] The practice-expense share of any procedure provided in the hospital with a surgical period of 0 days should probably never exceed 24% of the total payment. The office follow-up portion of hospital-based procedures is grossly overpaid as well.

Using a weighted average to assign practice expenses is not reasonable from a methodological standpoint. The utilization of the data from the AMA survey in this analysis is useful as a valid critique of the flawed method that the HCFA employed in assigning anomalous practice-expense RVUs. That HCFA is in error by its own standard is clearly demonstrated in the tables. Nevertheless, the assignment of practice expenses on the basis of a weighted average of the expense shares does not accurately measure practice expenses.

The physician-work RVU developed by Hsiao is a service-specific constant number, relative to valuations of other services. It measures one specific physician service.

In contrast, the practice-expense RVU is derived from a weighted average of the average expenses of specialties that perform that service. It is not a procedure-specific number. It is a derived number that is descriptive of a set of many different services. Other services influence the average more than the service to which it is assigned. It is not reasonable to add a procedure-specific number to an average to get an accurate total value for a specific service.

When the actual practice expense incurred in providing each service is known, an expense ratio can be calculated for each service. A set of all the actual practice-expense ratios for every service will form a distribution around the mean. If it were a normal distribution, about one half would be higher than the mean and one half lower, and the graphic appearance would be the classic bell curve. (The expense ratios may form a skewed distribution.) For almost every service, the expense ratio of the service will differ to a lesser or greater extent from the mean. By assigning practice expense by the mean, the process automatically under-reimburses those services whose expenses exceed the mean and over-reimburses those services whose expenses are less than the mean.

It may appear that, with a large number of services, the variation in underpayments and overpayments would balance out and therefore not make a significant difference. For the superset of all physician services performed by all specialties, this is true. However, the underpayments and overpayments are not evenly distributed among specialties. For an even distribution of varied payments to occur among different services and specialties, the variations from the mean would have to be random, but they are not. Without service-specific valuations of practice expense, the practice-expense–dominated services will be underpaid, and the physician-work–dominated services will be overpaid.

The consequences of underpaying office practice expenses and overpaying hospital practice expenses are severe and extensive. Since office practice expenses are underpaid, office-based physicians cannot compete with hospital-based physicians. Under the RBRVS, the subspecialty physician's office payments are exactly the same as the primary care physician's payments. Therefore, to equalize the severe underpayment for practice expenses, subspecialists are left with an economic incentive to provide expensive hospital procedures.

It is not within the scope of this paper to discuss the primary care shortage and the health care crisis, but both are partially a result of the above-described economic dynamic. To the extent that the nation's health care costs are needlessly increased by the vagaries of a physician payment scale, the anomalous practice-expense payments and lack of an inflation index in the RBRVS are inherent causes of the health care crisis.

The policy of nonpayment for technical expenses in the office is demonstrative of a bias against office-based minor surgical services. The most cost-efficient venue for health care services is the physician's office, and, therefore, performance of technical procedures in the office is much more economical than in the ambulatory surgical center or hospital. The policy of nonpayment of ECG interpretation is also evidence of a bias against cognitive services.

As of January 1, 1992, when the old Medicare fee scale was abandoned, there had not been an increase in total compensation to balance the effect of inflation on office practice expenses since 1984. By 1991, the practice expenses of office visits were already severely underpaid, but HCFA moved the same underpaid practice-expense payments of 1991 into the RBRVS. Therefore, primary care clinics have not had an equal-to-inflation increase in the reimbursement of practice expenses since 1984. The one-time boost of 15% in compensation for the average office visit will be overtaken by the effect of inflation, and result in a 38% loss in after-expense compensation by the time the RBRVS is fully implemented in 1996. Thus, the net effect of the RBRVS will be to postpone the noncompensation point for after-expense physician work of office-based services for 3 years, from 1998 to 2001. It is not reasonable to expect physicians to continue to practice primary care if their net incomes continue to decrease.

Economists, government leaders, and professional leaders may quibble over the results obtained from the rough calculations presented here. The actual practice expense of the average office visit will likely differ from the estimate calculated on the basis of the physician-work RVU of the RBRVS and the expense ratio of the AMA survey. Also, the average annual output of work RVUs by physicians may differ from the estimate of 4700 work RVUs used here. Future inflation may be greater or less than 5%. However, the primary principles elucidated in this study are incontrovertible:

1. The RBRVS undervalues the actual practice expenses of office-based services.
2. The effect of the underpayment for primary care practice expenses is a reduction in after-expense physician work payment, and, conversely, the effect of overpayment for hospital-based practice expenses is an increase in after-expense physician work payment.
3. Inflation will inevitably increase the practice expenses to the point where after-expense physician-work compensation is reduced to zero.

Given these concerns, the RBRVS must be corrected:

1. HCFA must adequately evaluate practice expenses and assign accurate reimbursement for each service.
2. The RVUs for physician work from Hsiao's team are essential to a revised RBRVS.
3. A separate practice-expense CF must be established and indexed to general inflation by law.
4. Congress must not change the practice-expense CF, but the CF for physician-work fee could be adjusted to meet budget cuts.

Accurate reimbursement for practice expenses must be assessed by consistent use of a formula applied to each physician service. Factors in the formula must include costs for employee wages, office rent, medical equipment, and technical supplies, as well as costs of transcription and maintenance of medical records, costs of meeting government regulations, and billing expenses.

Conclusions

By investigating and correcting physician-work RVUs but not practice-expense RVUs, at best, HCFA dealt with only one of the two major issues in physician payment reform. At worst, the RBRVS will result in the demise of primary care services by the end of the decade.

Every day that health care services are reimbursed under HCFA's RBRVS is a day of deceit. Probably no primary care office in the country can provide services at the unrealistically low practice-expense rate of 40% specified by the RBRVS. Conversely, every reimbursement for hospital-based expenses that exceeds the cost of billing for the service is a payment for expenses never incurred.

As a result of the failure of the RBRVS to adequately reform our system of physician payment, many government leaders will be tempted to conclude that a fee-for-service compensation plan will not work. In 1988, then head of HCFA William L. Roper, MD, objected to RBRVS in his testimony to Congress, and in an editorial in JAMA.[16] Roper asserted that capitation is the way to solve the problems of physician compensation. However, the failure of the current RBRVS does not necessarily support such a conclusion. Rather, the currently flawed RBRVS should be corrected.

Congress intended to level the playing field between office-based physicians and hospital-based proceduralists when an RBRVS was mandated. However, HCFA's RBRVS fails to do this. The inequitable practice-expense valuations of the RBRVS must be fixed as soon as possible, perhaps by sending the RBRVS back to Hsiao's group to assign procedure-specific practice-expense RVUs that are indexed for inflation. Congress should not abandon the RBRVS without giving a corrected RBRVS a fair chance to prove its beneficial effect on physician payment reform.

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