Wound Center Facility Billing: A Retrospective Analysis of Time, Wound Size, and Acuity Scoring for Determining Facility Level of Service

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Outpatient wound center facility reimbursement for Medicare beneficiaries can be a challenge to determine and obtain. To compare methods of calculating facility service levels for outpatient wound centers and to demonstrate the advantages of an acuity-based billing system (one that incorporates components of facility work that is non-reimbursable by procedure codes and that represents an activity-based costing approach to medical billing), a retrospective study of 5,098 patient encounters contained in a wound care-specific electronic medical record database was conducted. Approximately 500 patient visits to the outpatient wound center of a Texas regional hospital between April 2003 and November 2004 were categorized by service level in documentation and facility management software. Visits previously billed using a time-based system were compared to the Centers for Medicare and Medicaid Services' proposed three-tiered wound size-based system. The time-based system also was compared to an acuity-based scoring system. The Pearson correlation coefficient between billed level of service by time and estimated level of service by acuity was 0.442 and the majority of follow-up visits were billed as Level 3 and above (on a time level of 1 to 5) , confirming that time is not a surrogate for actual work performed. Wound size also was found to be unrelated to service level (Pearson correlation = 0.017) and 97% of wound areas were <100 cm^2. The acuity-based scoring system produced a near-normal distribution of results, producing more mid-range billings than extremes; no other method produced this distribution. Hospital-based outpatient wound centers should develop, review, and refine acuity score-based models on which to determine billed level of service.

KEYWORDS: Medicare reimbursement, CMS, chronic wounds, acuity, wound size

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Outpatient wound center facility reimbursement for Medicare beneficiaries is defined by the Centers for Medicare and Medicaid Services (CMS) in the Hospital Outpatient Prospective Payment System (HOPPS). (Physician reimbursement by the CMS is determined by the 1995–1997 Medicare guidelines for physician documentation and will not be discussed in this paper.) The HOPPS, published on April 7, 2000 in the *Federal Register*,[1] was intended to revise the outpatient payment system for hospital clinic and emergency departments, as well as for all hospital outpatient departments that did not have an existing billing schedule, such as outpatient cancer centers or pain management clinics. Wound care centers were instructed to use three sets of the five Evaluation and Management (E&M) Codes: new patients — codes 99201 to 99205; consults — codes 99241 to 99245; and established/follow-up — codes 99211to 99215.[1] Although the CMS directed facilities to bill using all of these classes of codes, only three payment groups existed. They are known as Ambulatory Patient Classification (APC) Codes 600, 601, and 602; the assigned payments were approximately $44, $52, and $82, respectively (approximate because several other factors impact the actual payment, such as wage index and locality).

In addition, as specified in the 2000 *Federal Register*,[1] each facility was expected to "develop a system for mapping the provided services furnished to the different levels of effort represented by the codes." Provided that the services were medically necessary and properly documented and that the facility was following its own developed system, the CMS would assume the facility was in compliance with reporting requirements. At the same time, the CMS emphasized that the intensity of facility visits and reporting codes should be based on "an internal assessment of the relevant charges for those codes as opposed to failing to distinguish between low- and mid-level visits because the payment is the same." One of the CMS goals through HOPPS was to study billing information to establish a database for revising weighing factors and other payment adjustments in future years.

"Time" was readily adopted by wound care clinics as a means of assessing the charged level of service for each patient visit. While a time-based analysis is an easy system to develop and subsequent billing codes are easy to calculate, this system rewards inefficiency. Although more complex wound care activities require more time, a system based on a subjective assessment of time spent could result in healthcare workers justifying a billed level of service that is inappropriately high compared to the actual work provided.

Recognizing this problem, the CMS announced its intention to provide specific guidance for determining level of service. In 2004, the American Hospital Association and the American Health Information and Management Association suggested to the CMS that facility level of service be based on wound size.[2] The model for this idea was the reimbursement methodology for acute wounds, a familiar concept in emergency departments (EDs). In acute wound repair, a direct relationship between wound size and work exists because these wounds are usually managed by surgical suturing — coding is based on the size of the ultimate repair of the wound and the type of repair (simple, intermediate, and complex) performed.

The wound-size proposal was based on a three-tiered size system in which the wound sizes chosen appear to have been arbitrarily determined by the CMS with possible input from consultants and were as follows: Level 1: <25 cm^2; Level 2: 25.1 to 50 cm^2; and Level 3: >50 cm^2. Because this system had never been applied to chronic wound management, little was known about its effects on outpatient wound centers; critical information such as the average size of various

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KEY POINTS

- Outpatient wound care services, as well as facility reimbursement standards for Medicare beneficiaries receiving these services, are relatively new.
- The results of this retrospective study, using data from more than 5,000 patient encounters, suggest that the time-based billing system overestimates and the wound area-based method underestimates the actual work involved.
- The acuity-based system was found to offer the most realistic assessment of chronic wound care provision. Additional studies to examine, refine, and adjust acuity-based billing and reimbursement are needed.

chronic wounds was unknown. Furthermore, it is generally accepted that unlike the situation in acute wound management, there is no demonstrated relationship between chronic wound care level of work and wound size. For example, patients with chronic wounds often are severely debilitated with multiple, complex medical problems and even small wounds can require extensive irrigation, packing, or complex bandaging. An economic study by Pompeo[3] (N = 240) utilizing a computerized system of wound tracking, for example, found that patients with the highest level of "wound burden" (defined as the degree to which a wound was related to costs) had significantly higher wound and total stay costs.

In addition, the size-based system did not include depth assessment; small wounds open to tendon or bone and requiring particularly complex interventions cannot be defined using a system based on surface area alone. Moreover, patients with chronic wounds can require extensive education regarding offloading, edema management, diet, or self wound care. For all these reasons, some method of assessing the specific elements of actual work provided needed to be developed in the chronic wound care setting .

While many healthcare systems in the US have instituted or adopted Electronic Patient Records (EPRs),[4-5] Computerized Physician Order Entry (CPOE),[6-7] and Clinical Data Support Systems (CDSS),[8-9] the level of detail and relevance of these systems to wound care centers are often unsatisfactory. Business corporations have developed systems, commonly known as Activity-Based Cost Accounting (ABC Accounting),[10] that more accurately measure unit costs associated with procedures and products and these techniques have been adapted in the wound care arena.[11] However, in the situation under consideration, simple ABC Accounting is not sufficiently robust to describe the broad range of activities involved in outpatient wound care. A more extensive system that is not based on time or wound size is needed.

In response to the unique demands of wound care documentation, two of the authors have spent more than 10 years developing a group of software programs to handle physician, facility, front office, and managerial documentation requirements. Their corporation (Intellicure, The Woodlands, Tex) now licenses its software for use by hospital-based wound centers. These programs, collectively known as the Intellicure Clinical Documentation & Facility Management Software (ICDFMS), are used not only to manage clinic operations, but also to document all aspects of patient medical data in the form of electronic medical records (EMRs), recording each patient visit in sufficient detail to enable tracking of wound parameters. Using the Structured Query Language (SQL)-associated database with the ICDFMS, the authors conducted a retrospective study to: 1) determine the average sizes and types of the wounds associated with a population of 500 patients who visited an outpatient wound center, 2) compare a time-based to a wound size-based or acuity score-based system, and 3) validate an acuity scoring system for those procedures and products not covered by specific American Medical Association (AMA) Current Procedural Terminology (CPT) codes under HOPPS.

Methods

Software description. The ICDFMS consists of the Intellicure Clinical Documentation software (formerly known as WoundTrak™), HyperTrak™, Inventory Trak™, Front Desk Manager™, and the Intellicure™ Management Database.

The Evaluation and Management (E&M) scoring sheet is intended for use at every patient encounter and comprises 10 major components:

1. Method of arrival
2. Additional resource utilization
3. Patient assessment (history, general physical exam, and risk determination)
4. Patient process (coordination of care, level of processing and education)
5. Problem-focused activities (areas of wound, ulcers, and burns; edema/lymphedema; and ostomy/continence)
6. Focused assessments and interventions
7. General procedures
8. Point-of-care testing
9. Departure instructions
10. Departure disposition.

For each patient visit, the level of service as billed by "time" and documented wound size is collected

using the Intellicure Clinical Documentation™ and Front Desk Manager™ software. Time does not differentiate between any type of activity. For example, a person could spend 10 minutes performing a complex debridement or 10 minutes moving a patient from point A to point B.

Data collection for the study. The dataset comprised patients seen between April 2003 and November 2004 at a busy wound center operated by Tomball Regional Hospital, Bryan, Tex, which had used Intellicure software since the center's inception .

To prevent any confounding due to additional billed services for the time-based billing analysis and to exclude all encounters in which the wound was not measured for the wound-size analysis, the patient visit database was reduced from approximately 12,000 to 5,098 patient visits and included only those visits in which the wound was measured and no separately billable procedures were performed. The study dataset comprised the following variables for each patient encounter:

- Patient ID to facilitate data verification, if needed
- Acuity scores (see next subsection)
- Associated wound sum area (sum of the surface areas of all wound problems documented in a single encounter — the formula proposed by the CMS)
- Time-based level of service (five levels) used for billing.

Development of the Acuity Scoring System. Intellicure began developing an acuity scoring system in response to the 2000 HOPPS publication. The acuity scoring system incorporates elements of a sophisticated ABC methodology for the E&M codes previously described and additional medical information needed for procedure-based billing and inventory control of medical supplies, as well as patient medical history and demographics. Acuity scoring also has been investigated as a billing methodology in trauma patients[12] but results of studies evaluating this approach as a measure of work in outpatient wound centers have not been published. While the acuity system continued in development, the clinic continued to bill using a time-based system.

Each E&M procedure listed under the 10 major components was assigned a score (0 to 200 points) based on the authors' experience. The higher the score, the more work was required to effect the activity or procedure. Not all procedures performed at the clinic were categorized this way because some can be directly billed using the AMA CPT codes listed under HOPPS (eg, Apligraf® [Organogenesis, Inc, Canton, Mass] is charged under a product code and the technical portion of the procedure; wound debridements also have specific billing codes). Only those elements of facility work that were not billable under a specific procedure code were included in the acuity scoring system.

To illustrate the development of the acuity scoring process, the example of dressing changes will be highlighted. Initially, dressing changes were categorized as simple, moderate, and complex and each product was assigned a score from 1 to 10. Thus, gauze — a commonly used product used almost exclusively in drainage control — was given 0 points, while the application of an Unna's boot compression bandage was assigned 10 points. The application of the compression bandage is covered under CPT code 29580 (Unna's boot); thus, to avoid duplication and an overestimation of work, 20 points were subtracted from the overall acuity score, reflecting the fact that the application of the bandage is billed with its own CPT code that incorporates an assessment of work for that procedure.

Acuity scores for patient encounters then were refined over several months, periodically plotting the data and searching for the best distribution of points over the activities identified. Table 1 shows the assigned scores for all individual activities grouped under the 10 major E&M categories.

Acuity score analysis. Statistical analysis was accomplished using back-end SQL data tables under the software company's Management Database using SPSS© software (Chicago, Ill). The acuity scores were analyzed to determine the mean and standard deviation (SD) and the normality of the distribution evaluated by the Kolmogorov-Smirnov procedure.

Acuity scores were allocated to the five levels of service in two ways. The first was equal membership in each level (*membership* used to define allocation to specific categories or elements of a mathematical function), which does not depend on the normal distribution property of the acuity scores; thus, it can be described as a non-parametric method. This was

TABLE 1
SCORE ASSIGNMENT TO EVALUATION AND MANAGEMENT SERVICES ACTIVITIES AND PROCEDURES

Activity/Procedure	Score	Activity/Procedure	Score
Arrival		***Additional Resources Utilization***	
Ambulatory	0	Isolation	10
Wheel chair	5	Patient with special needs	10
Stretcher	10	Languages; translator	15
		Altered mentation	15
History and Physical Examination		***Patient Process***	
Patient history	10	Patient processing: simple	6
Review of systems	10	Patient processing: complex	12
Chronic and inactive conditions	7	Coordination of care	8
General physical examination	8	Development and/or assessment of adherence to care plan	4
Risk assessment	2	Patient education	4
PROBLEM-FOCUSED ACTIVITIES (M = MULTIPLY)			
Wound, Ulcer, Burn		***Edema, Lymphedema***	
Assessment (m)	4	Edema assessment (m)	4
Cleansing (m)	3	Circumference measurement (m)	5
Area measurement (m)	4	Edema dressing (m)	10
Undermining measurement (m)	2	***Ostomy/Continence***	
Volume calculation (m)	1	Assessment and management of incontinence-related skin disorders	10
Photography/tracing (m)	2		
Application of simple dressing (m)	8	Assessment and management of peristomal skin disorders: re-pouching	20
Application of moderate dressing (m)	13		
Application of complex dressing (m)	18	Stoma marking	20
Hydrotherapy/hydrodebridment	20		
Biotherapy	20		
FOCUSED ASSESSMENTS/INTERVENTIONS			
Nutrition	8	Peripheral neuropathy	10
Diabetes management	10	Dermatology (skin care)	8
Peripheral arterial disease	12	Mobility, offloading/gait assessment	15
General Procedures		***Point-of-Care Testing***	
Medication: application of a topical	5	Bedside glucose testing	8
Medication: injection	10	Orthostatic vital signs	10
Medication: IV management	15	Hand-held Doppler	10
Cast removal	10	Wound culture: swab	10
Patient transfer: Boyet lift/bariatric lift	8	Blood draw	5
Suture/staple removal: simple	5	Specimen collection	5
Suture/staple removal: complex	10		
Departure Instructions		***Departure Disposition***	
External environmental planning	15	Routine hospital admission	10
Simple departure instructions	10	Emergency admission	20
Complex departure instructions	15	Routine transfer to another facility	10
		Discharge with assistance	20

defined by rank-ordering the acuity scores and then dividing them into five equal membership groups. Because the acuity scores were designed to measure services provided on an equal value basis, distinguishing first visit encounters from follow-up encounters was not necessary. The second method was based on normal distribution percentiles in which the lowest membership was given to levels 1 and 5, highest membership to level 3, and intermediate membership to levels 2 and 4. This was accomplished by setting the cut-off points at -2, -1, +1, and +2 SD intervals.

The billing rate per point was calculated by dividing the billing rate by the average acuity points for each of the five levels for both approaches. To obtain the uniform billing rate, the mean billing value per point was multiplied by the average acuity point for each level. Finally, the uniform billing rate was multiplied by the number of patients in each level and these figures summed to obtain the total billing based on both approaches.

Analysis by time and correlation with acuity score. Initial and follow-up visit data were analyzed separately by determining the frequency for which various levels of service were billed categorized by the CPT codes 9924*x*, where *x* corresponds to 1 to 5 and 99241 would be service Level 1, a "minimal" visit. The relationship between the time level of service and acuity score was analyzed using the Pearson correlation coefficient, which can be employed in this situation.[13]

Wound diagnosis, size measurement, and correlation with acuity score. A critical problem of billing by wound size is that no universally accepted, reproducible method of wound measurement is available.[14] Figure 1 shows the dilemma posed by a typical wound in which the wound surface area, calculated by the longest x widest method, yields 4.50 cm^2, while the head-to-toe x perpendicular axis method yields 3.27 cm^2, a 38% difference based on the lower figure. Without a standardized, easily implemented measurement method, a reimbursement system based on size would have the probability of encouraging "overestimation" of wound surface area. In this study, all wounds were measured using the longest x widest method of calculation, a rectangular equivalent area.

Figure 1. *A typical wound showing two measurement systems: the longest x widest calculation, which yields an area of 4.50 cm^2, and the head-to-toe x perpendicular calculation, which yields an area of 3.27 cm^2. (Key: black—longest x widest; green—head-to-toe x perpendicular.)*

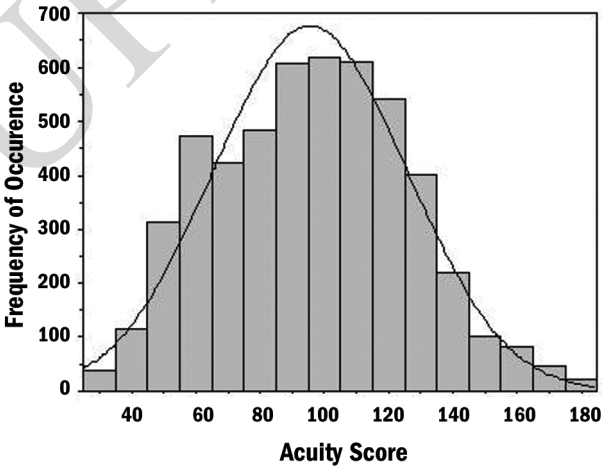

Figure 2. *Frequency distribution of raw acuity scores (N = 5,098; mean = 95.6; SD = 30.01) with superimposition of normal curve for comparison (line).*

TABLE 2
ACUITY SCORE SERVICE LEVELS

	Equal Level Membership		Normal Distribution Membership		
Service Level	*Cut Point*	*Patient Count*	*Cut Point*	*Normal z*	*Patient Count*
1	0 to 66	1,022	0 to 35	<-2	47
2	67 to 87.5	1,017	36 to 65	-2 to -1	935
3	88 to 104	1,035	66 to 125	-1 to +1	3,267
4	105 to 121	1,026	126 to 155	+1 to +2	701
5	>121	998	>155	>+2	148
Total		5,098			5,098

TABLE 3
ACUITY-BASED LEVEL OF SERVICE, EQUAL MEMBERSHIP METHOD

Acuity-Based Level	Acuity Point Range	Patient Count	Average Acuity	Medicare Rate ($)	Medicare $/point	Revised Billing Rate ($)	Revised Billing ($)
1	0 to 66	1,022	53.864	42	0.780	33	33,726
2	67 to 87	1,017	77.597	42	0.541	48	48,816
3	88 to 104	1,035	96.156	52	0.541	60	62,100
4	105 to 121	1,026	112.807	82	0.727	70	71,820
5	>121	998	138.253	82	0.593	86	85,828
Total		5,098		Mean	0.621	Total	302,290

The distribution of wound areas was analyzed empirically to determine the best mathematical representation. The correlation between wound area and acuity score was determined using the Pearson correlation coefficient because both variables were normally distributed and calculated for both mathematically transformed and untransformed data.

Results

Acuity score analysis. The acuity scores for all 5,098 encounters ranged from 26 to 184 and constituted a near-normal distribution, with a mean of 95.6 (SD 30.0) (see Figure 2). The distribution failed the Kolmogorov-Smirnov test for normality because the lower tail is a little too short and a bulge occurs around 60. However, the difference from normal is relatively small as is noted by the normal curve superimposed on the histogram.

The results of the two ways of defining levels of service showed that the counts are not perfectly balanced because many acuity points have the same value (see Table 2). All identical values were placed into a single level and not split to enforce an even count. A total billing of $302,290 was calculated, which is a 13.2% reduction from $348,326 (time-based method) in billing (see Table 3). In contrast, using the normal distribution percentiles method results in the most revenues coming from Level 3. Nevertheless, the reduction in billing amount, relative to the time-based method, is similar (13.1%) (see Table 4).

Analysis by time and correlation with acuity score. The frequency with which various levels of service were billed for each initial encounter categorized by CPT codes showed that the billed level of service increased exponentially — the majority of initial consultations were billed at the highest facility level of service (see Figure 3).When follow-up visits were similarly analyzed, the most frequently billed level of service was Level 3 (CPT code 99213), with progressively fewer follow-ups billed at Levels 4 and 5 (see Figure 4). Although the Pearson correlation coefficient was 0.442 and the correlation was statistically significant ($P < 0.01$), the results were highly inconsistent (see Figure 5). Acuity scores of 80 were billed in all five time levels of service; whereas, acuity scores 100 or higher were billed in all of the top four levels. The CMS-approved time-level billing for the 5,098 patient encounters was $348,326 (see Table 5).

TABLE 4
ACUITY-BASED LEVEL OF SERVICE, NORMAL MEMBERSHIP METHOD

Acuity-Based Level	Acuity Point Range	Patient Count	Average Acuity	Value $/point	Revised Billing Rate ($)	Revised Billing ($)
1	0 to 35	47	32.090	0.621	20	940
2	36 to 65	935	54.440	0.621	34	31,790
3	66 to 125	3267	96.480	0.621	60	196,020
4	126 to 155	701	135.790	0.621	84	58,884
5	>155	148	164.930	0.621	102	15,096
Total		5,098				302,730

Wound diagnosis, size, and correlation with acuity score. The 5,098 patient encounters

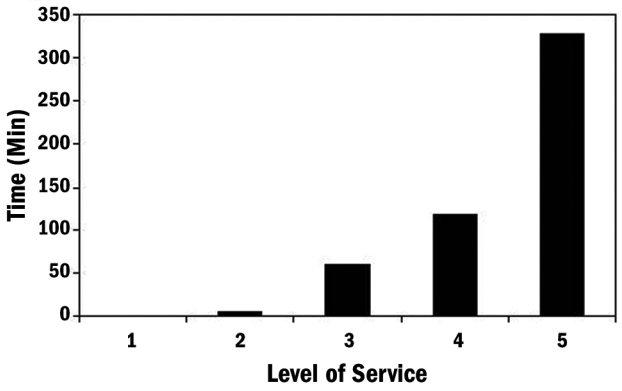

Figure 3. *Frequency of service level using CPT codes for initial visits (N = 510) for the analysis by time.*

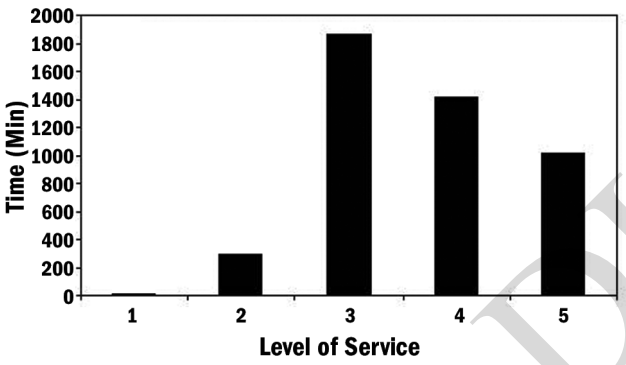

Figure 4. *Frequency of service level using CPT codes for follow-up visits (N = 4,588) for the analysis by time.*

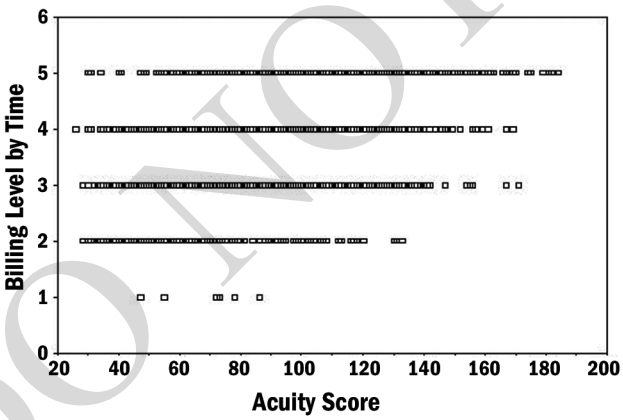

Figure 5. *Relationship between level of service (analysis by time) and acuity score.*

in the database contained 510 initial visits and 4,588 follow-up visits and the majority of encounters were patients with venous ulcers and traumatic wounds (see Table 6).

TABLE 5
TIME-BASED LEVEL OF SERVICE MEMBERSHIP AND BILLING

Time Level	Medicare Rate	Patient Count	Medicare Code	Medicare Billed
1	42	9	611	378
2	42	296	611	12,432
3	52	1,917	612	99,684
4	82	1,535	613	125,870
5	82	1,341	613	109,962
Total		5,098		348,326

TABLE 6
AVERAGE WOUND SIZE BY TYPE
(MEASURED USING THE LONGEST X WIDEST CALCULATION METHOD)

Wound Type	Number of Wounds	Number of Encounters	Average Wound Size (cm^2)
Arterial	22	111	7.15
Diabetic	66	1,198	13.24
Postop	98	1,147	9.37
Traumatic	236	1,671	16.72
Pressure	206	1,519	5.38
Venous	237	2,632	12.66

Wound areas ranged from 0 to 605 cm^2, with a median value of 2.3 cm^2 and a mean of 13.1 cm^2. The distribution of wound areas <100 cm^2 (97% of the wound areas) is shown in Figure 6. If the full range of values is plotted, the histogram collapses to a single cell on the left with a trail of insignificant columns to the right.

Statistical analysis determined that wound areas were log-normal in distribution (see Figure 7). Figure 8 shows the plot of logarithm of wound area versus acuity score (Pearson correlation coefficient of 0.055). Direct correlation of the untransformed wound area data with the acuity score yielded a correlation coefficient of 0.017.

Discussion

Not surprisingly, initial consultations were viewed as the most time-consuming and billing by time tends to overestimate the billed level of service for follow-up visits. If time were a good measure of the work

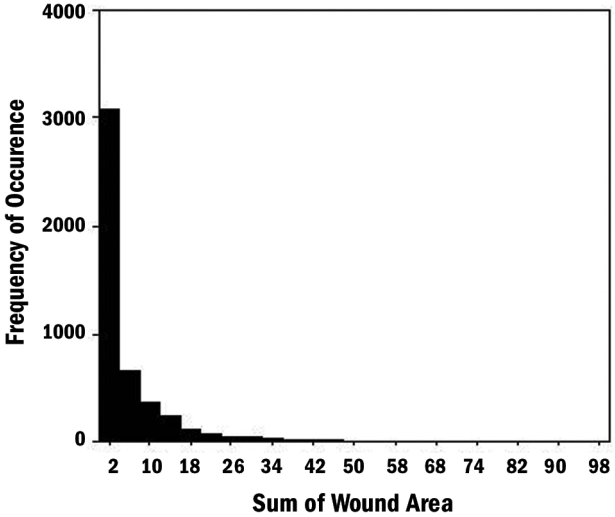

Figure 6. *Distribution of wound areas <100 cm²; N = 5,098; mean = 13.1; SD = 37.48.*

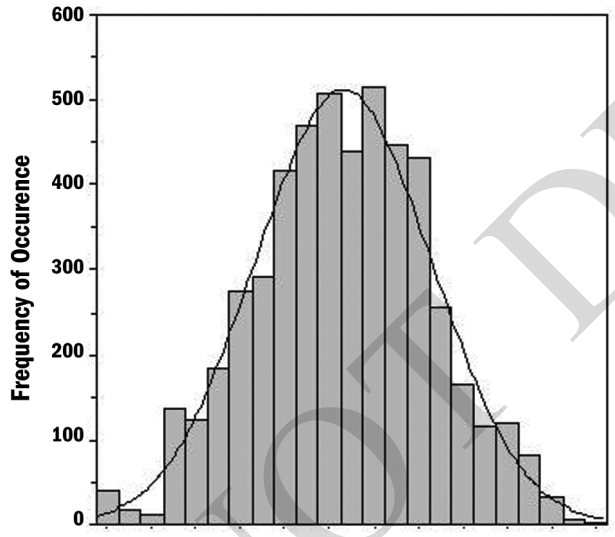

Figure 7. *Distribution of wound areas shown on a natural logarithm scale; N = 5,095; mean = 0.81; SD = 1.98.*

required for each level of service (excluding directly reimbursable procedures and products), a correlation would be expected with an acuity-based system; this was not the case. The correlation coefficient between billed level of service by time and estimated level of service by acuity was 0.442, confirming that time is not a surrogate for actual work. In an ideal system, a more normal distribution of visits would be expected, with the number of follow-up visits billed at less than Level 3 approximately equal to the number of follow-up visits billed as greater than Level 3. Time-based level of service was found to be a more reliable determinant than wound area but is still too arbitrary to constitute a consistent cost-related basis for billing.

For wound care clinics, a wound size-based system is not a viable basis for billing, regardless of how the levels of service are defined. In many cases, the final follow-up visit would have a wound area of zero (completely healed), making it unclear how these encounters would be billed in this system.

Based on the CMS proposal, this retrospective study showed that 89.4% of patient encounters would be billed at the lowest APC Code, which is tantamount to being reimbursed with a "one size fits all" billing system. If the time-based and wound-size-based analyses are compared on a financial basis, the CMS wound size-based proposal would result in a substantial decrease in billed revenue, provided the average value per point of $0.621 is maintained. Thus, while the time-based system might be fair in the acute care setting, these findings suggest that it does not translate to the chronic wound care setting.

Part of the problem is the broad range of wound areas — ie, nearly five orders of magnitude. Wound size data approximate a normal distribution once they have been transformed into a log scale. By implication, any linear scale employed to categorize wounds by area will fail in terms of fairly distributing the data for billing purposes. This is in addition to the other problems of measuring wound size and the differing amounts of work required to deal with different types of wounds. The other part of the problem is that wound area does not correlate with work performed, a fatal error for billing purposes.

How can the actual cost of providing patients with wound care services for items that are not directly reimbursable be determined? A system that measures the actual work performed, utilizing a tool such as the E&M scoring sheet, would seem both fair and straightforward to implement. The idea behind this system is to allocate the amount of work and product cost to each item that might be utilized in a patient encounter. As the point system was reviewed and refined, a normal distribution curve emerged that is more consistent with the actual value added during a patient encounter. In fact, in a recent Hospital Outpatient Regulation memorandum, the CMS reiterated statements made in its November 1,

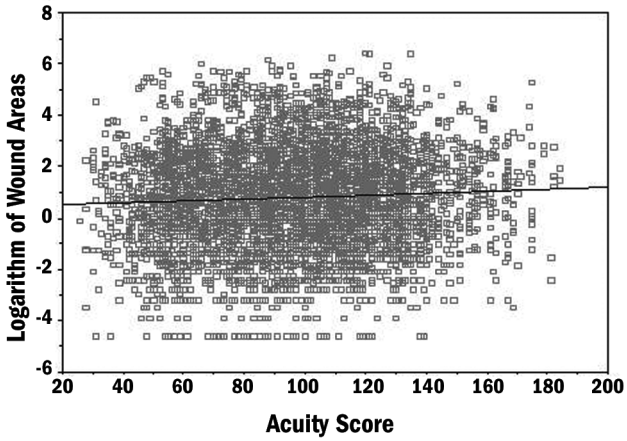

Figure 8. *Correlation of acuity score and log wound area.*

2002 OPPS Final Rule: "… the distribution of codes should result in a normal curve."[15]

All that would be needed to implement such a system is an accepted list of all the non-directly reimbursable procedures/products and an acuity score for each item. Although Table 1 provides such a schema, this system can be further improved.

The primary disadvantages of such a system are that it 1) requires detailed chart documentation and 2) is time-consuming to calculate by hand. Any items "checked" on the scoring sheet as having been carried out must correlate with specific documentation in the patient record. Obviously, in this scenario, clinics utilizing a wound care-specific EMR, which incorporates the scoring sheet into the documentation package and calculates the level of service automatically, have an operational advantage. An additional advantage of such an EMR is that it is data-based, which allows for further refinement based on logical analysis rather than arbitrary assignment of values. The E&M scoring sheet can be easily modified to delete procedures a clinic never uses or add others not currently listed, giving flexibility to the scoring system. Thus, the authors intend this tool as a starting point for the development of a comprehensive system that can undergo further validation using patient data.

In the system evaluated, the ranges of acuity scores for the five levels of service were determined based on each level being assigned 20% (on average) of patient encounters. This is for demonstration purposes; other schemes utilizing the normal curve can be developed. One such scheme was presented in Table 4. Also, although there are five levels of service, they track to only three payment amounts

according to rules determined by the CMS. For this reason, the "normal membership" method of acuity scoring might be superior. The result is that scores ranging from 0 to 65 (levels 1 and 2) will track to the lowest payment schedule, scores ranging from 66 to 125 (level 3) to the second payment schedule, and scores from 126 and above (levels 4 and 5) to the highest payment schedule. The authors followed Medicare's instructions that the ideal billing system would result in a "normal distribution" of clinic charges over a large dataset. Therefore, it was necessary not only to define an acceptable tool to measure acuity, but also to define the appropriate "break points" to relate acuity score to level of service. Regardless of whether "equal membership" or "normal distribution" breakpoints were utilized, the breakpoints are integral to the scoring system to ensure fairness in billing.

Conclusion

Results of this study suggest that time-based billing methods will likely overestimate the work involved in outpatient wound care; whereas, size-based methods will likely underestimate the actual work involved. Wound area has been shown to be unrelated to the value-added activities and should not be pursued further. Acuity-based systems seem to offer the most realistic assessment of work actually performed in association with wound management. Moreover, acuity-based systems can be adjusted in a variety of ways to provide suitable levels of service for billing purposes. - OWM

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