PAIN PROCEDURE VALUATION AS A COMPETITIVE STRATEGY

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Milan2012 14TH WORLD CONGRESS ON PAIN®

INTRODUCTION

The Macon value formula which is presented in Fig.1a as defined by Fig. 1b calculates a quantitative mean value of pain interventions based on outcome and costs. Value is defined in the economic literature as the outcome per dollar spent (ref 1). A pilot study (n=10 for each group) comparing treatment of lumbar radiculitis treated with lumbar epidural steroid injections or lumbar microdiscectomy was performed to illustrate use of the value formula.

METHODS

This value equation with outcome and cost data entered by the user is displayed in Microsoft Excel spreadsheet format (Figs. 2 and 4). The success rate is calculated based on the entered outcomes and user defined success range.

The value equation is a quotient of summation series dividing the sum of successful outcomes by the sum of all payments for interventions received by all providers (Fig 1).

Groups of interventions for comparison consist of only one procedure (CPT) code each used to treat the same diagnosis codes (ICD9) clearly defining the treated condition. Group population size as determined by the user is defined as n or the sum of all individuals k.

The numerator in the equation contains two variables (Fig 1b). O_k is the outcome for individual k based on a 0-100 scale. Outcome is determined at the specified time interval after treatment (e.g. 1-12 months) and entered into the spreadsheets by the user. The definition of outcome is determined by the user with multiple measures used to compare values per measure (e.g. % pain relief or % recovery of disability).

The variable s (the success factor) in the numerator is a logical function which is 1 when the outcome O_k is in a defined success range (e.g., 70-100) and 0 when the outcome is below the success range (e.g. <70). The product of s and O_k is O_kS representing the successful outcomes which are summed to create the total for the numerator.

The denominator in the equation contains two variables (Fig 1b). D_k is the total payment (in thousands rounded to the nearest $100) to all providers for the specified interventions for each individual k at the specified time interval of the study. D_k is constrained to a minimum of $100 to limit maximum value to 1000. The cost data for the interventions rounded to the nearest dollar is entered into the spreadsheet by the user.

The variable c (the cost factor) in the denominator is a logical function which is 1 when an additional cost of intervention is incurred and 0 when no additional costs are added or when a successful outcome has been achieved by prior interventions at the specified time interval. The product of c and cost equals D_k or the total payment to all providers for the intervention under study which are summed to create the total for the denominator.

The value formula calculates a mean value for each intervention group based on the individual values in the group. The value range is 0 to 1000. When all outcomes are 100 and costs are $100, the maximum value of 1000 is achieved. When all outcomes are below the defined success range resulting in O_kS equal 0, the result is the minimum value of 0. The results allow value comparison of two or more procedures.

The percentage mean success for the group is calculated by summation of the success rates of the individual interventions divided by group number n and displayed in different spreadsheets for each time duration studied (e.g. Figs. 2 and 4). The success rate is to be compared with the calculated values of each group.

The data derived from the spreadsheets is then be displayed in summary tables (Figs. 3 and 5) to assist provider decision-making based on value, success rates and cost.

A graph of value vs time then demonstrates value trends over time for the procedures compared (Fig. 6) to show the durability of the calculated values.

FIGURES

Macon Value Formula

$$\text{VALUE} = \sum_{k=1}^{n} s(O_k) \Big/ \sum_{k=1}^{n} c(D_k)$$

A Quantitative Value Analysis Formula for Comparison of Pain Interventions Based on Outcome and Cost Data

FIG. 1a

Formula Variables

$$V = \sum_{k=1}^{n} s(O_k) \Big/ \sum_{k=1}^{n} c(D_k)$$

- n is the number in the intervention group
- O_k is the outcome for individual k (0-100)
- s is 1 if outcome success and 0 if failure
- D_k is the total provider payment (min. $100)
- c is 1 for additional cost and 0 if no cost
- V is the relative value calculated (0-1000)

FIG. 1b

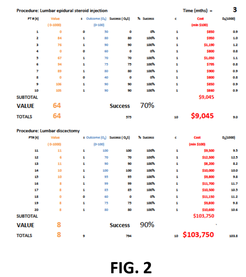


FIG. 2

Value Formula Summary Table 3 Months

CPT	VALUE	SUCCESS	COST
62311	64	70%	$9,045
63030	8	90%	$103,750

FIG. 3

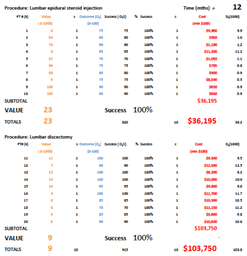


FIG. 4

Value Formula Summary Table 12 Months

CPT	VALUE	SUCCESS	COST
62311/63030	23	100%	$36,195
63030	9	100%	$103,750

FIG. 5

GRAPH

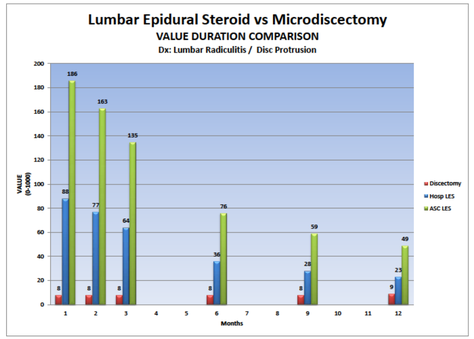


FIG. 6

RESULTS

This pilot study data analysis comparing different treatments and sites of service for lumbar radiculitis due to lumbar disc protrusion is presented to illustrate the validity of the value formula process only and does not have adequate power to render conclusions regarding effectiveness due to the small patient numbers entered into the formula spreadsheets (n = 10). However, when substantial differences in value between groups are readily evident, such pragmatic clinical trial results may be used to guide individual practice decisions based on data derived from the practices studied.

Lumbar radicular pain was the primary outcome measure used for this analysis calculated with the numerical rating scale (0-10) and converted to % return to baseline (0-100) prior to entry into the spreadsheets (Figs. 2 and 4). An outcome success range of 70-100 was selected beneath which outcomes were 0 based on the success factor s. Summary tables indicate that at 3 months (Fig. 3) the mean value for the lumbar epidural steroid injection group was 64 and the mean value of the lumbar discectomy group was 8 whereas the success rates were 70% and 90% respectively. At 12 months (Fig. 5) the 3 failures of the lumbar epidural steroid group had been crossed over to the lumbar discectomy group and the mean value was decreased to 23 (due to the payments for the 3 surgical procedures) compared to the lumbar discectomy group which was 9. Both groups at 12 months had a 100% success rate. Remarkably the cost differential in the two groups was responsible for the value difference since the less invasive procedure was 11.5x less expensive and when performed first reduced the number requiring the more expensive intervention by 70%.

The graph of value duration over time (Fig. 6) demonstrates erosion of value during the one year study period for the lumbar epidural steroid group and stability of value for the lumbar discectomy group. However, after one year the less invasive procedure continued to have 2.5x greater value due to preferred sequencing of the procedures. The graph (Fig. 6) also demonstrates that when procedures are performed in less expensive sites of service (ASC) the values are increased (2.1 x) compared to the higher cost sites of service (hospital).

SUMMARY

1. Healthcare competition in a free market may be influenced by a number of factors which include access, outcomes and cost. Value for patients may not correlate with actual value unless insurance premiums are reduced by value optimization.

2. The Macon value formula described in this presentation allows synthesis of procedure outcome and cost data into a simple 0-1000 value scale which may be used to compare procedure relative values and produce graphical display of results over time (Fig. 6).

3. Value optimization as a goal (ref 1) will assist in medical decision making when two or more procedures are available for treating the identical diagnosis. Value calculation reveals certain optimizing steps evident from the data which include: 1) perform only procedures with a reasonable probability of achieving success, 2) sequence procedures so higher value procedures are performed first, 3) eliminate unsuccessful procedures based on the success factor (s=0), 4) perform procedures at lower cost facilities and 5) avoid patient preference from dominating value considerations.

4. Competition on value will allow pain practices offering more conservative and less costly procedures to effectively compete with more invasive and higher treatment cost practices. The value formula calculation provides time-dependent data which when promoted and advertised will properly support increased patient and insurance company referral to practices which optimize value.

5. Use of the Macon value formula to calculate value for comparative procedures will allow small practices to perform pragmatic mini-trials producing practice specific valuations which may be used for competitive advantage and marketing.

REFERENCES

1. Porter M, Teisburg E, "A Strategy for Health Care Reform-Toward a Value-Based System" N. Engl. J. Med. 361: 109-112, 2009.

To use the Macon Value Formula

- Request a copy of the spread sheet for use in your practice to compare intervention groups
- E-mail : macon@fnspinc.com and request
- The Macon value formula is copyright protected by the U.S. Copyright Office
- Credit the formula to the author when data is presented or published.

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