

Using Data-Driven, Principled Negotiation With a Clinician-Integrated Approach to Achieve Best Values on Spinal Implants

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Abstract:

Objectives: In many health systems, the costs of surgical implants are one of the largest components for surgical budgets, and economies of scale in purchasing agreements do not always provide increased value due to lack of data transparency and administrative complexity. The purpose of the study was to determine if clinician-informed, well-defined negotiation strategies informed by market-based pricing and volume data from supply chain experts within the health system could achieve lower pricing levels for spinal implants and reduce the number of vendors.

Methods: Market data based upon pricing levels for implants were reviewed from an industry implant price database and utilized by surgeon clinicians and supply chain management (SCM) to select benchmark pricing levels for common spine implants used at our institution.

Results: Benchmark modeling to the 25th percentile among comparable institutions was used in the request for proposal (RFP) sent to all vendors. After three rounds of structured negotiation involving SCM and surgeon leaders, 20% savings over the previous year's total spend was achieved, with a total savings upward of one million dollars; 8 of 22 vendors were excluded from the system.

Conclusion: Negotiation tactics included utilizing benchmark pricing data, "economies of scale" principles, game theory principles, and strong internal communication strategies between supply chain, physician leadership, and actively practicing surgeons. These findings demonstrate that there is significant opportunity for healthcare SCM to further negotiate contracts and achieve favorable pricing on items such as spinal implants with surgeon collaboration and utilization of benchmark data.

Background

In many business sectors, the “economy of scale” principle leads to larger purchasing volumes corresponding to lower purchase prices. Large enterprises are often able to leverage the scale of their operations to obtain cost advantages through standardization and “bulk discounts.” In addition to “bulk discounts,” economies of scale can lead to decreased marginal costs due to fixed costs being “spread out” over larger volumes and thus can provide a competitive advantage for companies with well-designed supply chains across many industries.

The concept of economies of scale is often used as justification for consolidation in healthcare, with claims of reductions in cost and improvements in quality of care. Consolidation in healthcare may support standardization of healthcare practices to increase value and safety.^{1,2} Standardizing care can offer benefits such as improved efficiency, lower cost of supplies, reduced staff time, and improved documentation. In parallel with care standardization, improvements in supply chain efficiency and organization within health systems may also support higher value care by reducing variation.³ However, cost reductions are often attributed retrospectively to decreased administrative functions and elimination of duplicative services, rather than economies of scale in purchasing agreements.⁴

Healthcare markets have less transparency of relevant data, so economies of scale are more difficult to achieve in this industry. Information related to health system volume and implant pricing is not readily available to clinicians and SCM—the decision-makers—and the contracting process often involves many different parties.⁵ This complexity contributes to an overall lack of transparency, particularly with regards to healthcare pricing, which affects the ability of hospital supply chains to achieve optimal pricing consistent with economies of scale.

In the setting of poor transparency, clear communication and negotiation can help health systems deliver upon the

potential for economies of scale. Principles of negotiation are well documented in other industries and discussed throughout the business literature.^{6,7} Illustratively, the *Harvard Business Review* has an entire section of their website devoted to negotiation.⁸ In particular, an understanding of game theory can be useful for identifying ways in which cooperation may be mutually beneficial in the negotiation process.⁹ Game theory is the study of the ways in which interacting choices produce outcomes with respect to the preferences of the agents involved.¹⁰ We are not aware of the objective, comprehensive documentation of negotiation tactics in the medical literature that would allow for evidence-based SCM negotiations.

Higher value care remains a primary challenge to healthcare systems, and data/analytics systems and processes are critical to meet these goals. An essential goal of higher value care is improving outcomes and lowering costs when possible. In many health systems, the costs of surgical implants are one of the largest components for surgical budgets. The purpose of the study was to determine if clinician-informed, well-defined negotiation strategies informed by market-based pricing and volume data from supply chain experts within the health system could achieve lower pricing levels for spinal implants and reduce the number of vendors.

Methods

Market data based upon pricing levels for implants were reviewed from an industry implant price database. The sample was narrowed to include comparable institutions based on procedural volume, patient characteristics, and geographic considerations. This information was used by surgeon clinicians and SCM to select benchmark pricing levels for common spine implants used at our institution. The benchmark was set at the 25th percentile among comparable institutions. Spine surgeons and surgeon leaders were involved from start to finish to ensure that surgeon concerns about implant options and quality were addressed in order to prevent prioritization based on pricing alone and ensure total “value.” Any financial

conflicts of interest were disclosed and care taken that these conflicts did not affect the negotiations. These pricing levels were set as expected purchase prices in our institution and used in negotiation with vendors.

This process occurred over nine months and included one RFP and two subsequent rounds of rebid requests and negotiation, along with six stakeholder meetings with SCM and surgeon leaders. In addition to significant supply chain staff involvement, we engaged over 40 clinicians across three hospitals and multiple departments, including the Department of Orthopedics, Department of Neurosurgery, and Division of Pediatric Orthopedics.

Results

Utilizing the industry implant price database, benchmark modeling to the 25th percentile among comparable institutions predicted a potential savings of 20% over the previous year’s contracts if these targets were met, with a total savings upward of one million dollars. The yearly spend for comparable institutions with similar established specialties typically ranges from \$5-20 million in contracts per year. These benchmarks were sent to 22 vendors at our health system through a centralized application, with a request that vendors comply with the price points for each category of implants. Each round of negotiation included several negotiation tactics outlined in Table 1. Bids that did not meet the benchmarks were not accepted and vendors were subjected to a one-year lockout from contracting with the department. The first round of negotiation resulted in 13% savings over the previous year’s total spend, moving the contracts to 68% of the benchmark.

The surgeons and SCM then pursued another round of negotiations and met with each vendor who had not initially submitted a bid that met the target prices, emphasizing the one-year lockout for vendors who did

Table 1. Negotiation Strategies

Clinician Integration	Start-to-finish integration of clinicians into data analysis and decision-making
Internal Communication & Presentation of a Unified, Coordinated Approach	Communication between supply chain and physician leadership
Application of Game Theory Principles	Application of game theory to the RFP process
Use of Data-Driven Target Pricing	Utilizing benchmark data to inform price targets, rather than arbitrarily anchored figures
Communication of Hard-Stop Deadlines	Setting and communicating clear deadlines for preliminary and final bids
Suspension of Loyalties to Legacy Vendors	Explicitly articulating that vendors would not be guaranteed volume for noncompetitive bids regardless of historical pricing and/or relationships
Removal and Lock-Out of Vendors	Vendors were locked-out for 12 months

not meet the benchmarks. The second round of negotiations resulted in 17% savings over the previous year’s total spend, achieving 86% of the original benchmark.

The third and final round of negotiations offered vendors a final chance to meet targeted pricing and avoid a one-year lockout from contracting with our institution. This resulted in 20% savings over the previous year’s total spend, achieving 100% of the benchmark.

After conclusion of negotiations, 8 of 22 (36%) vendors were dismissed from the system and subject to a one-year lockout based on inability to meet benchmark pricing or other aspects of the contract (Figure 1).

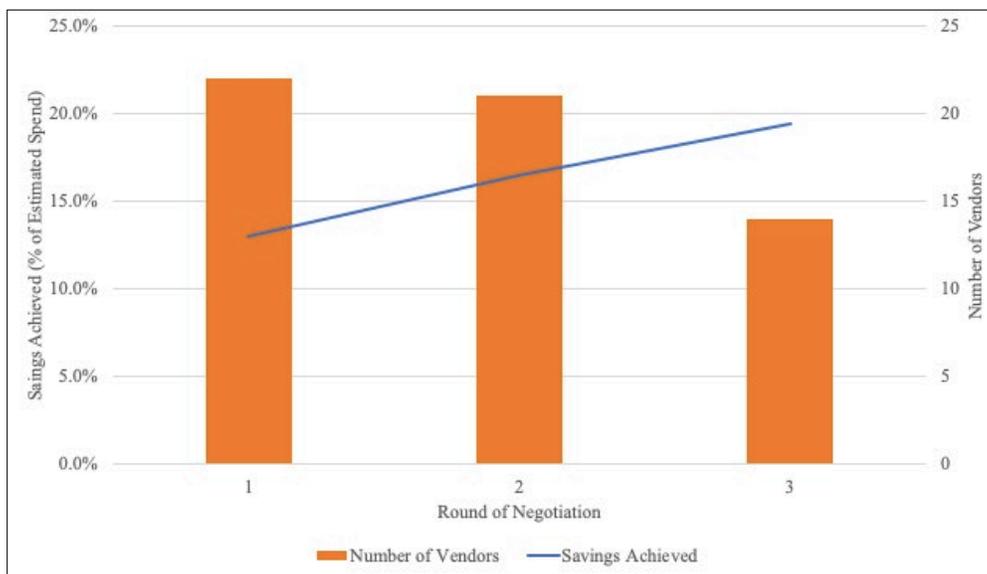


Figure 1. Savings achieved and number of vendors retained across the rounds of negotiation for spinal implants

Discussion

These findings demonstrate that there is significant opportunity for healthcare SCM to further negotiate contracts and achieve favorable pricing on items such as spinal implants with surgeon collaboration and utilization of benchmark data. The achievement of an estimated 20% savings and well over one million dollars was accomplished after three rounds of negotiations. Negotiation tactics included utilizing benchmark pricing data, “economies of scale” principles, game theory principles, and strong internal communication strategies between supply chain, physician leadership, and actively practicing surgeons.

We started the process by collecting objective data. Experienced clinical input on use of product and patient outcomes and benchmarking implant pricing data enabled our SCM to set prices that were founded in data. This required time and effort; however, it was critical in the negotiation process because it provided a strong justification for our RFP requests and subsequent negotiation.

Principles of negotiation are well documented in other industries and discussed in many books about business.

“Indeed, wherever parties with different interests and perceptions depend on each other for results, negotiation matters.”¹¹ In one of the more well-known books about negotiation, *Getting to Yes*, Fisher et al. discuss key tenets of successful, principled negotiation: focus on interests, not positions, separate people from the problem, invent options for mutual gain, and insist on using objective data.⁷ While the core of our negotiation was about contract pricing, ultimately both parties have

aligned goals—physicians at the hospital want to use a vendor’s products, and the vendor wants the contract with our institution. “Negotiation, like the delivery of healthcare, is at its core about understanding and engaging with people more effectively.”¹² By pursuing multiple rounds of negotiation, we were able to develop relationships and learn about all relevant parties’ interests, even among physicians and administrators within our own institution.

Economies of scale are also well known in other industries and should allow hospitals to achieve decreased per-unit costs on larger orders and contracts.¹³⁻¹⁶ However, there may be failure to achieve benefits from economies of scale in healthcare due to a lack of cost-minimizing negotiation and lack of clinically engaged partnership with aligned goals. In the traditional fee-for-service model, hospitals may focus less on negotiating discounts with suppliers if they are being reimbursed at desirable profit margins, or they may focus instead on their “downstream” negotiating power with payors. Reimbursement tends to be negotiated based on hospital costs for equipment and services, and profit margins may decrease incentives for supply chain consolidation.¹⁷ However, as government payors account for an increasing proportion of healthcare reimbursement, with diagnosis related group (DRG)-based payments, the cost of supplies, including surgical

implants, will increasingly affect hospitals' ability to cover their costs and maintain positive profit margins.

Complexity in hospital supply chain may contribute to difficulties negotiating individual purchasing contracts. While the hospital system may have significant buyer power, when the purchasing is divided among many vendors these benefits are muted; it detracts from the ability to negotiate "bulk discounts," as each vendor contract is smaller. Reducing the number of vendors leads to higher purchase volumes from the remaining vendors, therefore providing opportunities for improved per-unit contract pricing and the possibility of better service from the vendor. The ability to offer vendors increased market share if they agreed to the price benchmarks (assuming some vendors were removed) was an important piece of leverage. This is an example of finding compatible interests in the negotiation process, rather than competing positions, as Fisher et al. discuss in *Getting to Yes*.⁷ Additionally, maintaining fewer vendors has the potential to simplify inventory management with regards to inventory tracking, storage requirements, and instrument processing.¹⁸

"Game theory" is also relevant to this negotiation process.⁹ Game theory is "the mathematical modeling of strategic interaction among rational (and irrational) agents ... it includes the modeling of conflict among nations, political campaigns, competition among firms, and trading behavior."¹⁹ The basic rationality principle of game theory assumes that each player will act to optimize for their interests.^{20,21} In an auction, rational players will make a bid if the expected utility outweighs their cost. We provided the RFP, and the vendors then had to make decisions about whether or not to agree to these terms; each vendor considers their own cost and expected utility, but they likely do not have this information for other vendors. Thus, if a vendor decided not to agree to our terms or to negotiate higher prices, they ran the risk of losing our business to other vendors.

A final, crucial negotiation tactic unrelated to economies of scale is communication and engagement.

Communication was key in this process. SCM and physician leadership worked closely in order to present a coordinated and unified front. This ensured that messaging to the vendors was not confused or undermined by different parties. Additionally, physicians were integrated from the beginning and involved in the discussions and decision-making. While one of the barriers to vendor or supply consolidation is often thought to be physician preference, we found that involving physicians in the decision-making process from the start was essential for clinician engagement and helped gain their support for the project. Other initiatives to reduce physician variability such as education programs are less likely to lead to sustained improvements.²²

Physician involvement enabled the implementation of strict engagement measures that can provide additional leverage to health systems when other strategies fail.²³ The use of hard-stop deadlines, acknowledgement of existing relationships but suspension of pre-existing loyalties, and threat of removal with lock-out can create penalties that limit the tendency of vendors to act in ways to pursue unilateral interests. Moreover, they can alter the choice architecture of negotiating decisions in a manner that favors the interests of health systems.²⁴ Pre-existing loyalties refer to established partnerships between legacy vendors and health systems or surgeons that may create preferences and biases unfounded in data. It is important to acknowledge surgeon preference and include them in the decision-making process; however, it is necessary to suspend these pre-existing loyalties during negotiations as they may hinder the ability of the health system to negotiate. The tactical use of strict engagement measures can be useful to support achievement of economies of scale in scenarios when other negotiating strategies between vendors and health systems fail.

Conclusion

In conclusion, a coordinated supply chain and clinician-led effort resulted in substantial cost savings as well as

consolidation of vendors. This achievement was supported by several negotiating principles, including (1) benchmarking implant pricing data, (2) start-to-finish integration of clinicians into data analysis and decision-making, (3) data-driven negotiation strategies, and (4) the tactical use of strict engagement measures. This process allowed our health system to realize the modeled savings in full and demonstrates that there is significant opportunity for hospitals to achieve additional cost savings through employing these strategies.

Additional Links

- Video: *Clinician Integration of Supply Chain and Value Based Care*, Drs. Kevin Shea, James Ater, and James Wall. AAOS Educational Video. Published January 30, 2020. Link: https://www.aaos.org/videos/video-detail-page/21497_Videos
- Supplement: Kocher MS. Value of Pediatric Orthopedic Surgery. *Journal of Pediatric Orthopaedics*. July/August 2015;35:S9-S13. doi: 10.1097/BPO.0000000000000536

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