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Ambulatory Surgical Centers: Improving Quality of Operative Spine Care?

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Abstract

Study Design: Narrative review with commentary.

Objective: Present healthcare reform focuses on cost-optimization and quality improvement. Spine surgery has garnered particular attention; owing to its costly nature. Ambulatory Surgical Centers (ASC) present a potential avenue for expenditure reduction. While the economic advantage of ASCs is being defined, cost saving should not come at the expense of quality or safety.

Methods: This narrative review focuses on current definitions, regulations, and recent medical literature pertinent to spinal surgery in the ASC setting.

Results: The past decade witnessed a substantial rise in the proportion of certain spinal surgeries performed at ASCs. This setting is attractive from the payer perspective as remuneration rates are generally less than for equivalent hospital-based procedures. Opportunity for physician ownership and increased surgeon productivity afforded by more specialized centers make ASCs attractive from the provider perspective as well. These factors serve as extrinsic motivators which may optimize and improve quality of surgical care. Much data supports the safety of spine surgery in the ASC setting. However, health care providers and policy makers must recognize that current regulations regarding safety and quality are less than comprehensive and the data is predominately from selected case-series or comparative cohorts with inherent biases, along with ambiguities in the definition of "outpatient."

Conclusions: ASCs hold promise for providing safe and efficient surgical management of spinal conditions; however, as more procedures shift from the hospital to the ASC rigorous quality and safety data collection is needed to define patient appropriateness and track variability in quality-related outcomes.

Keywords

ambulatory surgery center, outpatient surgery, spine, quality

In the current era of health care reform, cost-optimization initiatives are imperative. Ambulatory Surgical Centers (ASC) present a promising avenue for health care expenditure reduction and the potential for improvement in the quality of spine care. ASCs have been shown to have a greater efficiency than hospitals for many surgical procedures and thus require lesser payments from private insurers and Medicare and less out-of-pocket payments for patients.[1,2] Many spinal procedures are possible candidates for the ASC setting in appropriately selected patients. While the potential economic advantage of ASCs is becoming evident, cost saving should never come at the expense of quality or safety. The spectrum of case complexity in spine surgery is broad and a substantial proportion of procedures and/or patients are not appropriate for the ambulatory setting. This necessitates a rigorous approach to quality assessment and monitoring as increasingly greater proportions of spine surgical procedures are being performed at ASCs.[3]

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This review on ASCs in spine surgery aims to provide a primer for surgeons and health policy makers. The focus will be on the key definitions surrounding ambulatory surgery, recent trends in utilization, opportunities for cost-optimization, potential impact of physician ownership of ASCs and the current regulations and data pertaining to quality and safety of spine surgery performed in the setting of an ASC. While ambulatory spine surgery is growing in popularity in many countries, the discussion in this review will be largely centered on the US health care system. It is here where the vast majority of pertinent health system data (both economic and quality related) is derived; however, the central tenets are applicable to other nations' health systems.

Key Definitions

A discussion of the role for ASCs in spinal surgery should be framed around 2 critical distinctions: (1) the difference between "outpatient" and "inpatient" surgery and (2) the difference between an ASC and a Hospital Outpatient Department (HOPD). Unfortunately, neither is clear-cut and this leads to challenges in interpreting quality and safety data.

Inpatient Versus Outpatient

According to the Centers for Medicare and Medicaid Services (CMS) in the United States, an individual is considered an "inpatient" of a hospital if formally admitted by a licensed practitioner and the expectation is that the patient's admission will span at least 2 midnights.[4] In accordance, the outpatient designation is employed when the length of stay is anticipated to be less than 2 midnights. Thus, "outpatient" surgery is not synonymous with same-day discharge. The "inpatient" versus "outpatient" distinction serves primarily for the purposes of provider remuneration. A group recently exemplified the practicalities of this distinction in patients undergoing anterior cervical discectomy and fusion (ACDF) using the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database.[5] Herein, "outpatient" and "inpatient" designations are assigned by the care provider (hospital or free-standing ASC). These researchers found a substantial discrepancy between a patient classified as "outpatient" and that individual's length of hospital stay. Of the 4123 "outpatients" who underwent an ACDF procedure, nearly 78% had at least one night of observation following surgery (Figure 1).

Distinguishing "outpatient" services from same-day discharge holds high relevance when studying quality and safety of surgery in ASCs. At the US federal level, an ASC is defined by the CMS as a distinct entity that operates exclusively for the purpose of providing surgical services to patients not requiring hospitalization and where the expected duration of services would not exceed 24 hours following an admission.[6] However, a number of states, namely Florida, Maine, Maryland, Nebraska, Rhode Island, and South Carolina mandate that patients are discharged from the facility on the same day as their intervention.[3] Safety and quality data from regions that permit overnight observation in an ASC may not be readily generalizable to regions that do not. Thus, investigators and policy makers who deal with the quality and safety of healthcare services provided by ASCs should explicitly disclose duration of observation following surgical intervention rather than classification by "outpatient" versus "inpatient."

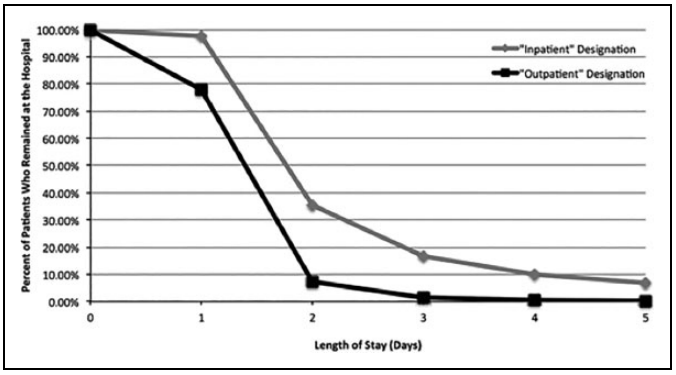

Figure 1. Comparison of length of stay between patients classified and "inpatient" and "outpatient" undergoing anterior cervical decompression and fusion. Data derived from the National Quality Improvement Program database between 2005 and 2014. Adapted from Bovonratwet et al.[5]

ASCs Versus HOPDs

With regard to the differences between ASCs and HOPDs, the distinction again pertains primarily to remuneration and also ownership. In the United States, ASCs receive payments from Medicare through a different system (and generally at a lesser rate) than HOPDs. An HOPD must be owned entirely by a hospital, thus individual physicians are unable to own a partial share of a HOPD (unless they are already owners of the hospital).[7] The same restriction is not imposed on ASC. Moreover, currently any entity classified as a HOPD must be located within the main campus of the hospital (within 250 yards of the primary hospital). Anything beyond this distance threshold is thus classified as an ASC regardless of ownership stake. The potential implications of these differences will be discussed in greater detail in the section on Impact of Physician Ownership.

Utilization Trends

The decade between 2001 and 2010 witnessed a 60% increase in the number of ASC operating rooms.[8] Concurrent with the escalation in operating room numbers in the United States was a rise in utilization for spine procedures. A study of the National Survey of Ambulatory Surgery data from the US revealed dramatic rises in the utilization of ASCs between 1994 and 2006; 340% for intervertebral disc disorders and more than 2000% for spinal stenosis.[9] More recently, using the Truven Health MarketScan database of private commercial insurance providers in the Unites States, Idowu et al[3] has found that the proportion of spine surgeries performed in the

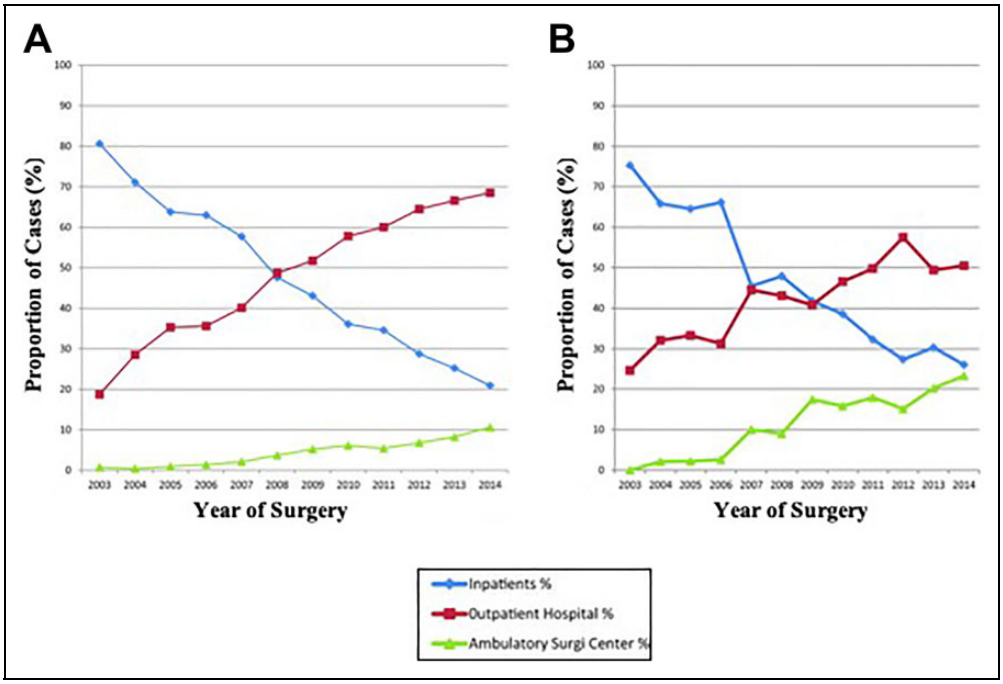

Figure 2. Temporal trends in proportional distribution by admission status and setting between 2003 and 2014. (A) Lumbar laminotomy for nerve root decompression (CPT 63 030). (B) Cervical laminotomy for nerve root decompression (CPT 63 001). Adapted from Idowu et al.[3]

outpatient setting (ASC or HOPD) has continued to grow between 2003 and 2014. For example, the proportion of single level lumbar laminotomies for nerve root decompression (CPT code 63 030) performed in ASCs or HOPDs rose from about 20% in 2003 to nearly 80% in 2014. The proportion of posterior cervical foraminotomies for nerve root decompression (CPT code 63 020) rose from 25% to 50% over the same time period.[3] While the aggregate proportions of both procedures performed at ASCs and HOPDs increased, the individual trends in ASCs and HOPDs differed. For lumbar laminotomies the rise in HOPD utilization was consistent over the 12-year study period, reaching 70% by 2014 (Figure 2A). However, the rise in ASC utilization was much more gradual; only reaching 10% by 2014. Conversely, for posterior cervical foraminotomy, the utilization of HOPD slowed after 2008 while ASC utilization rose to nearly 25% of cases. By 2014, the authors observed a nearly equal distribution between ASCs and the inpatient setting (Figure 2B). Of note, these authors restricted their data to US states with regulations that necessitate same day discharge from ASCs. Further research into the comparative differences in proportional utilization will be needed to ascertain this impact of regional regulations on duration of observation. Regardless, as technology, surgical technique, and pain management strategies improve, it is likely that the transition from hospitals to ASC for certain spinal procedures will continue.

Optimization of Efficiency and Cost

Across surgical specialties it has been demonstrated that charges and payments for procedures performed at ASC are substantially less than for similar procedures performed in the inpatient setting. This certainly holds true for spine surgery.[10,11] On the surface, this appears to be an economic disincentive to perform surgery at an ASC. However, surgeon productivity is one of the primary drivers in shifting more surgical interventions to an ASC. These ASCs are often smaller and more specialized than HOPDs with fewer staff who are more familiar with the specifics of the procedures performed thereby optimizing efficiency.[2] It has been observed that average surgical time is reduced by at least 30 minutes across all types of surgeries when the intervention in performed at an ASC rather than a HOPD.[1] These ASCs are also more attractive to patients, particularly those with high co-payment insurance plans. Patients are drawn to ASCs because the lower overall payments result in a relative decrease in their payment portion.

As more procedures shift away from inpatient hospitals, payers need to carefully consider the future impact this may have on the balance of remuneration. Payers should be cognizant that as more patients undergo surgery at ASCs, those who do have their intervention at an inpatient hospital are more likely to have an increased burden of comorbid disease or be undergoing procedures of increased complexity. Thus, payers and providers will need to monitor case distributions and costs to ensure that a disincentive to perform surgery in the inpatient setting does not develop. Ultimately, bundled payments based on the intervention and patient comorbid factors may help offset this potential imbalance in case distribution but policy makers should remain vigilant of this dynamic process of shifting certain select cases away from the inpatient hospital and to the ASC.

Impact of Physician Ownership

One of the primary concerns expressed regarding surgeries performed in ASCs is the potential conflict of interest inherent with physician ownership stake in the ASC. Over 80% of ASCs are owned at least in part by physicians. Physician-owners have incentives directly aligned with that of the ASC. A more efficient operation means increasing profit margins for the ASC, derived from less expenditure while remuneration remains unchanged. This provides an extrinsic motivator to optimize the surgical and recovery process and improve overall quality of surgical care; a motivator with far lesser presence in hospital owned departments. Conversely, it has been observed that physician-owners of ASCs have a higher propensity to recommend surgical intervention for their patients when compared with their colleagues who do not have an ownership stake in an ASC.[12] In fact, it has been estimated that the opening of an ASC may increase the outpatient surgical utilization by up to 10%.[8] This concept of "induced demand" could offset the potential cost savings of transitioning procedures to an ASC. However, in a study specifically focused on spine surgeons published in 2018 it was reported that in the 2 years following an investment in a physician-owned specialty hospital, there was no statistically significant change in the total number of monthly cases performed per surgeon-owner per month.[13] The same research group also compared treatment algorithms for patients who underwent an ACDF at a physician-owned specialty hospital versus those who have the procedure at a university-owned tertiary care hospital. The authors reported that a higher percentage of patients who had surgery at the physician-owned specialty hospital attempted more nonoperative treatments than patients who underwent surgery at the tertiary care hospital.[14] While studies of this nature are often limited in their ability to control multiple unobserved confounders, these findings from a single group suggest that physician ownership may have a lesser impact on "induced demand" for spinal procedures than that found in other areas of specialization. However, more data will be needed to ascertain if their findings are generalizable to other surgeons and centers.

Safety and Quality Metrics

Regulatory Oversight

Safety and quality reporting for ASCs in the United States has been formally mandated by the CMS. The quality metrics primarily applicable to spine surgery include the occurrence of patient burns, falls, surgery performed on the wrong site or patient, incorrect procedure or implant as well as all-cause hospital transfer/admission.[15] However, it is clear that this formal list of metrics is far from comprehensive in its pertinence to quality of spine surgical intervention. In fact, even a seemingly rigorous metric such as hospital transfer/admission to assess complications from care at an ASC may underestimate the true incidence. Fox et al[16] studied over 1200 ASCs across three states and found that hospital transfer at discharge is a rare event with little variance between ASCs. Conversely, when the authors evaluated the rate of access to acute care services (emergency department visits or hospital admissions) within the 7 days following an intervention at an ASC, they found the rate to be nearly 30-fold higher than hospital transfer directly from the ASC with a much higher degree of variability between ASCs.[16]

Safety and Quality Data

While formal health policy regulations may be falling short of establishing the true safety of spine surgery at an ASC, a substantial body of data have emerged in the medical literature to support the safety of certain spinal procedures.[17,18] Much of the preliminary feasibility and safety data in the literature is derived from lumbar discectomy and decompression procedures.[19-23] These case series largely support the safety and efficacy of performing such procedures in an outpatient setting. More recently, surgeons have begun investigating the feasibility of performing more invasive procedures in the outpatient setting such as minimally invasive transforaminal lumbar interbody fusion and direct lateral lumbar interbody fusions.[24-27] These case series and small comparative cohort studies of highly selected patients also generally support safety and effectiveness.

The spine procedures which typically garner the most attention from the perspective of safety are those involving an anterior approach to the cervical spine. The anatomical proximity of the airway to the surgical corridor elevates the risk of a postoperative complication leading to an acute life-threatening condition.[28] For this reason, numerous publications may be found on the safety of outpatient ACDF. These are well summarized in a review published by Sivaganesan et al[18] in 2018. However, one of the primary challenges with defining safety relates to the lack of strict consistency in the definition of "outpatient." Only one of the higher quality studies on "outpatient" versus "inpatient" ACDF in Sivaganesan's systematic review (level 3 evidence with more than 50 patients) clearly defined an "outpatient" as an individual who is discharged on the same day as surgery.[29] The remaining studies utilized the provider's definition of "outpatient," which potentially included an overnight stay.[11,30-35] This reemphasizes the premise that surgeons, researchers, and policy makers alike should be aware of the difference between "outpatient" classification and true postoperative length of stay when critically evaluating data pertaining to the safety of spine surgery in an ASC.

In addition to the limitations imposed on the current literature by ambiguity in the definition of "outpatient," a large proportion of the data is derived from single-arm observational case series.[18] These noncontrolled studies have an inherent potential for selection bias that portends younger, healthier, fitter patients undergoing their procedures in an ASC setting. Appropriate patient selection for the ASC is critical and not all patient are candidates for an ASC regardless of how small the procedure. Moreover, in the case of comparative studies, which include an inpatient control arm, it is necessary to adjust for

baseline differences between the outpatient and inpatient cohort with appropriate statistical methodology such as propensity score matching, fixed effects regression modeling or more advanced methods of controlling for biases in nonexperimental data such as instrumental variable analysis.

While these methods fall short of randomized trials in their ability to control for the biases of unobserved confounders, presently more and more quality and safety data are being derived from large observational datasets such as NSQIP and Healthcare Cost and Utilization Project (HCUP) State Ambulatory Surgery and Services Databases (SASD).[36] Thus, it is likely that these statistical methods will become increasingly important and surgeons and policy makers should ensure a sound understanding of their role when critically evaluating the data.

Revision Surgery

Within the constraints of the aforementioned limitations, a body of literature currently supports the safety of spine procedures performed at an ASC.[17,18] However, the horizon on which outcomes are evaluated is relatively short (most often 30-90 days). Recent studies have emerged to suggest that rates of revision surgery are higher in patients having spine surgery performed at ASCs. Arshi et al[37] analyzed an administrative claims database for patients who underwent a 1- to 2-level posterior lumbar spinal fusions between 2007 and 2015. Patients in the outpatient group had a significantly higher risk of undergoing revision surgery. The same group used a similar methodology to study outpatient ACDF procedures and also found that the risk of undergoing a revision surgery within one year of the index operation was significantly higher in the outpatient cohort.[38] The authors suggest extrinsic motivators for higher throughput may influence the specific technical nuances of the procedures such as rigorous endplate preparation, which may predispose patients to higher reoperation rates for pseudarthrosis. These interesting findings should however be interpreted with caution. Notably the "outpatient" cohorts were drastically smaller than the inpatient cohorts for both studies. In the case of posterior spinal fusion, the "outpatient" cohort was 770 patients (3% of the "inpatient" cohort) and for ACDF the "outpatient" cohort was 1214 patients (9% of the size of the "inpatient" cohort). This suggests a potential for bias. There may only be a small cohort of surgeons performing the procedures in the "outpatient" setting. If these surgeons were to be more aggressive in their decision making regarding revision operations, then the cohort would be biased toward a higher risk. To make a fair assessment, the revision rates of individual surgeons who operate in both settings should be factored into the comparison.

Provider Discretion and Discharge Criteria

One of the most concerning trends emerging in spinal surgery is the inherent influence of private insurers' and CMS's refusal to remunerate overnight admissions in patients who are deemed appropriate for "same-day" discharge. A downside of bundled payments in a value-based system is the influence this has on disposition decision making. System-based protocols that include discharge criteria will ensure safety checkpoints are established and followed prior to same day discharge from an ASC.[39,40] While helpful in the assurance of consistency, these discharge pathways may not adequately capture all the nuances of the decision surrounding safe discharge. Ultimately, the discretion should fall on the provider (surgeons, anesthetists, and nurses) to decide disposition. Financial factors should never influence this critical decision. Insuring entities should respect the safety and quality decisions made by medical professionals and cover additional expenses when they are warranted. One option to mitigate these costs when a patient is deemed unready for discharge home may be to expand the utilization of "short-stay" units. Herein, patients may be monitored by a healthcare provider in a structured setting, but without the same costs incurred by an individual admitted to an acute care inpatient bed.

Conclusions

Much recent attention has been directed toward ASCs as a means to optimize cost expenditures through enhancement of surgical efficiency. Spine surgery in the ASC setting may be a promising avenue for improved quality through alignment of goals between physician-owners and the ASC, utilization of smaller specialized staff and extrinsic motivators to incorporate technology, surgical technique and pain management strategies to improve efficiency and quality of care. However, health care providers and policy makers must recognize that the current regulations regarding quality reporting from ASC fall woefully short in their comprehensiveness of quality of surgical and medical care and the data available in the literature is drawn predominantly from case-series of highly selected patients and comparative cohorts with inherent biases and often ambiguities in the definition of "outpatient."

Declaration of Conflicting Interests

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