

surgeon and refer all spine cases to this specialist. Conversations with orthopedists currently in spine fellowships indicate that they are looking to perform at or near the MGMA mean, and suggest 450 cases (300 inpatients) per year as their target. The general orthopedists want the spine specialist to take general orthopedic call, but believe that this will only generate 10% of the spine specialist's patient activity.

Incorporating these assumptions into the formula indicates the need for 1.2 spine surgeons to serve the target population.

$$\text{Spine surgeon demand} = (2.6 \times 175 \times 0.7 \times 1.0) / (300 \times 0.9) = 1.2$$

Two considerations

Practice setting

A spine surgeon's relationship with his or her colleagues and with the hospital(s) where he or she practices will influence patient referral sources and volumes as well as call coverage responsibilities and how they are fulfilled. These, in turn, will influence both the success of a practice and physician satisfaction.

As is the case with most physicians, spine surgeons typically practice as part of a group, often a single-specialty group. An orthopedic spine surgeon joining a group of orthopedists may well find that the group is already subspecialized (including, for instance, joint replacement, sports medicine, and hand surgery) and that the physicians are fellowship trained. This setting will likely be supportive of a specialized spine surgery practice with no responsibility for general orthopedic call. Because there are fewer neurosurgeons, a neurosurgical spine specialist joining a group is more likely to find that there is a responsibility to practice some general neurosurgery and to be part of the general neurosurgical call schedule.

In arrangements such as solo practice, perhaps as a hospital employee, or being part of a multispecialty group, there may be no established patterns or expectations of the spine surgeon. In these cases, both the surgeon and hospital or group leadership will be well served by an extra measure of care in exploring referral sources, call responsibilities, relationships with colleagues, and so forth.

The key aspects of a spine surgeon's relationship with the hospital involve the business of spine surgery.

The business of spine surgery

Although the physician and hospital both have a role in providing spine surgery, they have different elements of financial risk. Physicians have little or no risk, as they are paid a predetermined rate for each procedure while their direct expenses per case are low and fairly predictable.

Hospitals are at risk for the cost of implanted material (hardware, bone graft, etc), as well as other expenses in the operating room and for patient care. The profitability of spine surgery depends on controlling these costs, which can vary greatly. One study found a threefold variation in the costs of implanted material used by physicians performing spinal fusion "for essentially the same materials, used for the same operation" [6]. For Medicare patients and any others covered by a fixed payment, the higher costs reduce the hospital's bottom line dollar for dollar.

Physicians who understand the business of spine surgery, as well as the clinical aspects, and are prepared to play a role in controlling costs while maintaining quality, may well find more and better practice opportunities. They will be more attractive to hospitals (which are often involved financially in physician recruitment and practice support), health plans and insurance companies, and any other individuals or entities that have a financial stake in spine surgery.

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Spine deformity and the artist: Laura Ferguson and the intersection of art and medicine

As C.S. Lewis once said, "God whispers to us in our pleasures, speaks in our conscience, but shouts in our pains: it is His megaphone to rouse a deaf world." Much can be said that a degree of *deafness* and misunderstanding commonly surrounds how individuals with spine deformities are perceived by society and from within. Many individuals with such conditions remain silent and retreat into the depths of their soul, often suffocating in the embrace of resentment, an arrest of self-empowerment, and a negative self-perception. However, such is not the case with New



Fig. 1. Crouching figure with visible skeleton. (©Laura Ferguson, 2005).

York-based artist Laura Ferguson—an individual with severe scoliosis who has dedicated her craft to raising awareness and understanding of spine deformity, underlining the symbiosis of delicate beauty and anatomical imbalance.

Laura was born in New York City in 1947 and at the age of 8 years was diagnosed with idiopathic scoliosis with right

thoracic and compensating left lumbar curves. When she was 13 years old and with a thoracic curve greater than 100 degrees, she underwent spinal fusion from T5 to T12 by Dr. John Cobb at the Hospital for Special Surgery in her hometown. As a result, her thoracic curvature was reduced to 85 degrees. In the years that followed, Laura began experiencing immense spine-related pain and discomfort; nonetheless, she opted to forgo additional spine procedures and relied on more conservative means to manage her symptoms. However, compelled to understand her condition, she diligently studied anatomy, physiology, and her own spinal imaging (X-rays and 3D spiral computed tomography scans). Using a painting technique referred to as the “floating colors process,” Laura intertwined art with medicine in an attempt of self-expression. Eventually, her collected works addressing her spine deformity were developed into the Visible Skeleton Series (Figs. 1 and 2) [1,2]. Throughout the years, Laura has had numerous exhibitions and collections showcased at various venues across the United States, such as the National Library of Medicine, the National Museum of Health and Medicine, and the American Academy of Orthopaedic Surgeons’ traveling art exhibit “eMotion Pictures” [2]. Among her many plaudits, her work has been featured as the cover art for the textbook of *Spinal Deformities: A Comprehensive Text* edited by Dr. Ronald L. DeWald. Her additional artworks, writings, and educational endeavors have also reached mass appeal.

Through her artwork, Laura has managed to provide an emancipation of disaccord. It is her spine condition’s disharmony and its interplay amid the female silhouette that captivates viewers in a dialogue between pain and beauty—between elements that provide a balance of human experience. Laura’s artistry suggests the absence of falling victim to a physical condition, and to rising above any social or medical stereotypes. According to Laura, “Creating images of

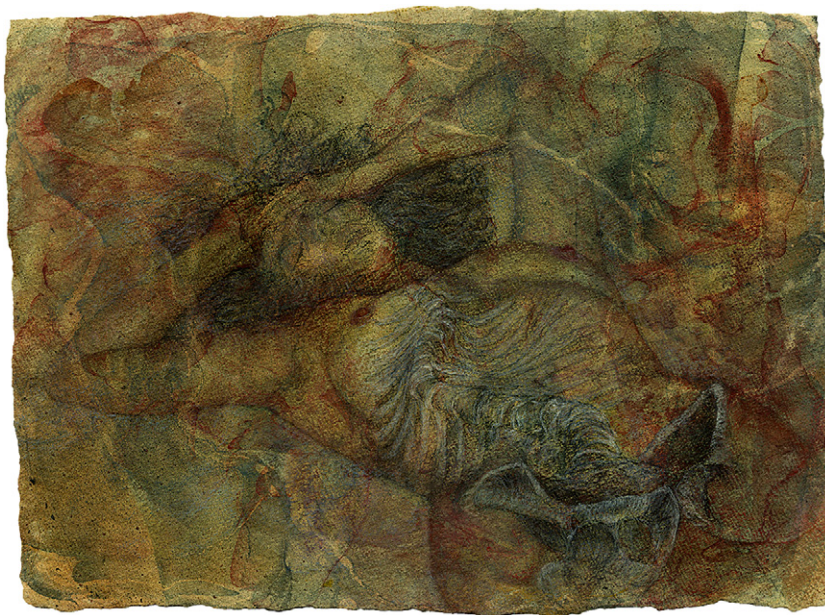


Fig. 2. Reclining figure with visible skeleton. (©Laura Ferguson, 2005).

my body that are anatomically accurate, but also personal, has felt empowering as if I were regaining a sense of ownership of my own body that had somehow been lost when my experience was medicalized” [3]. Unlike previous artists that implement their physical attributes as the sole subject matter in their art to denote their suffering and life’s perils, Laura uses her condition to celebrate the many facets of life, and to give a vivid testimony on the complexities of spine deformity and the beauty of the human body in any form or function. Moreover, Laura’s work endeavors to bring into the limelight the often ignored and unseen agony individuals with spinal deformities may possess; however, in tandem, she stresses that no deformity can ever amputate one’s spirit, passion to live, and the ability to perceive one’s self as beautiful. In Laura’s work, the spine becomes a vocal conduit, assuming a persona filled with twists and turns that encompasses existence and, in truth, adds to it a unique color. It is within such variation that individuality is formed and owned, full of melodic sound and fury, needing to be heard and understood—especially among a *deaf world*.

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Letters to the Editor

Calcium phosphate silicate for spinal fusion: a good alternative to bone morphogenetic protein-2!

To the Editor:

We read with interest the article by Wong et al. on the “Neurologic impairment from ectopic bone in the lumbar canal: a potential complication of off-label PLIF/TLIF use of bone morphogenetic protein-2 (BMP-2) [1].” There are numerous reports of complications with BMP in the cervical and lumbar spine most of which are related to the dose-response and lack of containment [2–5]. We are advocates of rh-BMP-2 in certain spinal cases and agree with Wong et al. on the possible complications with off-label use. We have reported on BMP-induced myositis ossificans of the psoas muscle occurring after posterolateral lumbar

fusion [2]. The BMP leaked through the intertransverse membrane onto the psoas muscle leading to ossification [2]. We have a recent case which also exemplifies this issue: a 45-year-old male was referred to our clinic for neurosurgical evaluation. Patient had previous posterior lumbar interbody fusion approximately 1 year ago, by another surgeon, and was determined to have a successful fusion. The patient complained of persistent lower extremity radiculopathy about 11 months after surgery. A computed tomography myelogram was performed and the patient was informed it was normal. The surgeon then removed his hardware without successful relief of the radiculopathy. The patients’ operative report revealed the use of BMP within the polyetheretherketone interbody graft. On physical examination, the patient had classic left L4 radiculopathy and the computed tomography myelogram actually demonstrated significant osteophyte formation projecting from the disc space and into the L4 foramen. The patient underwent re-exploration with microscopic guidance and was found to have significant osteophyte formation arising from the interbody graft traversing into the foramen and compressing the L4 nerve root. This was meticulously resected and the patient postoperatively had full relief of radiculopathy. We do not use BMP around the neural elements for the aforementioned reasons. We have found excellent fusion results with the use of calcium phosphate silicate (Actifuse, Apatech Inc., Foxborough, MA, USA). Actifuse has a gelatinous consistency which prevents leakage onto nearby neural elements and has provided an excellent medium for bone growth. We will use BMP off-label in high-risk fusion cases and combine it with Actifuse for containment. There are several reports on the importance of BMP dose and containment and how most of the problems with the use of allograft products are from abnormal dosage and lack of containment [2–7]. Wong et al. and our previous reports exemplify the importance of containment. We commend Wong et al. on their report and agree that BMP use does lead to heterotopic bone formation; however, there are numerous reports of complications that support the importance of containment and dosage.

