

# Fracture Expenses...Unbundling the Challenges

AUTHOR: Elizabeth Hofheinz, MPH, MEd

When someone with a fractured hip or femur arrives at the emergency room (ER), that person is tethered to a host of economic and political realities faced by today's healthcare system. Injured and fighting for their limb (or life), the patient's fate is tied to the decisions and policies of our healthcare system, meaning surgeons, hospitals, payors, and the government. Surgical outcomes may or may not be good, depending on the patient's history, comorbidities, the surgeon's experience, and an array of other factors. Given the traditional wisdom that one should control what one can control, in this situation, shouldn't all feasible measures be taken to reduce as many unknowns as possible in the midst of the turmoil?

The U.S. is facing complex and innumerable healthcare challenges and it's highly unlikely that any one entity will solve the entire problem. For those focused on trauma, however, there are some solutions within reach.

## Framing the Problem

Perhaps the most complicated long-term domestic issue that has plagued the U.S. healthcare system is the lack of an organized government response. When you add to the mix the effect of multiple lobbying firms jousting for power and leverage for their clients, getting a handle on the problem gets even more complicated. According to the Centers for Medicare and Medicaid Services (CMS), U.S. healthcare spending grew 4.3% in 2016, reaching \$3.3 trillion or \$10,348 per person.<sup>1</sup>

According to some experts, it is imperative that we have more streamlined and accurate systems with which to assess and evaluate the economic outcomes of new healthcare strategies. The authors (Hussey P, et al.) of this study said, *"Many 'reforms' have worked in one place, but we have almost no examples of their successful replication. If we can develop a common set of tools for design, evaluation, and assessment, we will be able to move more quickly and effectively to reject or embrace policy solutions on the basis of the evidence."*<sup>2</sup>

So, what do we have to work with now? On the way out, we have the uncoordinated turmoil of the Fee-for-Service (FFS) model. Replacing this are the value-based options, such as bundled payments and Accountable Care Organizations (ACOs) that are aimed at reducing healthcare spending, while improving quality by giving providers the financial incentive to eliminate services that are ineffective or redundant. Do these newer models work well for trauma surgeons?

## Perfect Storm for Economic Loss

According to the Orthopaedic Research Society there are approximately 15 million fractures per year in the U.S.; up to 20% will not heal properly.<sup>3</sup> Osteoporosis-related fractures exceeded 2 million in 2005 with an associated total cost of \$17 billion.<sup>4</sup>

And in a particularly expensive twist for trauma surgeons, hip fracture patients tend to be older and have more medical conditions than patients who undergo elective total hip replacement (THR).<sup>5</sup> In a bundled payment scenario where physicians are financially responsible for complications and readmissions, trauma surgeons are carrying more responsibility and possibly bearing more of a financial burden than their orthopedic (non-trauma) counterparts.

Examining fractures as a whole, by 2025, U.S. fractures and their associated costs are projected to rise by almost 50%. The most rapid growth is estimated for people 65-74 years of age, with an increase greater than 87%.<sup>6</sup> Adding fuel to the fire is the research showing that a prior fracture is associated with an 86% increased risk of new fracture.<sup>7</sup>

## Higher Price Tag on Trauma

When that motorcycle rider or gunshot victim lands in the ER, odds are that their treatment is going to be more expensive than that of 60-year-old Mrs. Jones down the hall who is recovering from planned hip replacement surgery.

A landmark 2015 study found that orthopedic trauma patients were two times (2x) more likely than general orthopedic patients to experience complications.<sup>8</sup> And research from 2017 showed that the difference in hospital charges between patients with minor or severe Severity Of Illness (SOI) who had elective total joint arthroplasty ranged between 153% and 211%. Compare this with individuals who had fracture surgery; who had differences in hospital charges ranging from 314% to 489% between minor and severe SOI levels.<sup>9</sup>

## Bundled Care...Not Going Anywhere, but is it Fair?

While bundled care is no magic bullet, it is here to stay. Aligned interests, reduced healthcare costs, and shared savings are some of the reasons for its popularity. One hospital system in Texas that participated in a voluntary Medicare bundled payment program for joint replacement experienced a 21% drop in the average Medicare spending episode. The researchers saw a drop in readmissions, ER visits, and cases with prolonged lengths of stay.<sup>10</sup>

A 2015 study found that for those in the trauma group the complication rate was 11.4% while for patients in the general orthopedic group it was 4.1%.<sup>11</sup>

If, indeed, orthopedic bundled care programs are largely successful due to the avoidance of complications, then this is a financial problem for the trauma market.

Especially if you look into the future. One estimate indicates that the total number of hip fractures in persons 50 years and older will rise to 512,000 by the year 2040.<sup>12</sup> A 2015 study found that hip and pelvis fracture patients were roughly seven times (7x) more likely to develop a perioperative complication than upper extremity patients.<sup>13</sup>

## Comorbidities Add Risk, Expense

And those fractures won't necessarily occur in the models who stare at us from tabloids at the checkout line. We are mere human beings and many of us are diabetics...or smokers...or have some other problem that lays us open to a poor clinical outcome.

Even in a normal fracture situation a surgeon may need, for example, to remove screws at the three-month mark or take out a fracture plate at around 18 months. But in instances of fixation failure (nonunion, breakage, etc...) that involve comorbidities such as diabetes, substance abuse, etc..., there are real problems. One study found that in the case of lateral locked plating of distal femur fractures, there were nonunion rates ranging from 0 to 21%. The researchers found that when obesity, open fracture, infection, and a stainless steel plate were NOT present (titanium instead of a steel plate), the risk of nonunion was 4%, but was an alarming 96% when all of the above factors were present.<sup>14</sup>

And what if the thread of the screw head becomes fused with the thread of the plate hole? That means more time in the OR, which has been shown to increase the risk of infection. Delayed or non-unions cost healthcare providers more than \$2 billion in failed operations in the U.S. alone.<sup>15</sup> We need better options.

## The Trauma Landscape

"We definitely have some challenges in the realm of trauma," says Paul Tornetta, MD, Chief of the Department

of Orthopaedic Surgery at Boston Medical Center, Chairman of Orthopaedic Surgery and Director of Orthopaedic Trauma at Boston University Medical Center.

Dr. Tornetta, a past president of the Orthopaedic Trauma Association, explains, "Nonunions, comorbidities, improperly placed screws, cold welding—all of these and more are issues faced by trauma surgeons each day. The biology of the host comes into play with regard to nonunion, so certain patients are vulnerable to infections (smokers, diabetics). You can get an atrophic nonunion because the construct is too stiff...or a hypertrophic nonunion because the construct is not stiff enough. Having bone to bone contact is the number one issue and it is a real problem when there are gaps."

"Most research indicates that nonunion is not within the surgeon's control (degenerative injuries, diabetes, smoking, etc...). Assuming that the surgeon applies reasonable mechanical principles to the construct then it all comes back to patient factors. I actually will not perform revision surgery on smokers and am known for doing nicotine tests. Being strict about this means that I have a higher than average success rate for revision surgeries."

"Fundamentally," says Dr. Tornetta, "we need to manage what we can manage. Surgeons need to get better on the front end, i.e., we must provide counseling with the goal of reducing modifiable risk factors."

"As for materials, while carbon fiber PEEK is more widely used in sports medicine than in trauma, carbon fiber PEEK does have the benefit of being radiolucent so the fractures are more visible and the healing process is more readily understandable. Other material properties are also important, particularly in nailing, where the amount of deflection and torsional rigidity can cause atrophic (too stiff) or hypertrophic (too flexible) nonunion. The last property is more related to the geometry than material modulus in plating, and that is fatigue. Most plate designs for type A and C fractures are heading in similar directions to last as long as possible while allowing the surgeon to build in the appropriate stiffness. Finally, there is a distinct advantage of being able to contour the plate to fit the bone exactly to use it as a reduction tool."

"I think it's best if we take a comprehensive view of things. We need to examine the societal cost of someone who has an injury and has to recover. This doesn't just involve what insurance pays, but loss of productivity as well. Someone with a fractured humerus will take eight weeks to heal. Add the overall recovery time and you're talking about roughly six months. Someone is paying for that," adds Tornetta.

## Summary

Voluntary bundled payment programs are only going to expand. On January 8, 2018 CMS announced another version of voluntary bundling to be called Bundled Payments for Care Improvement (BPCI) Advanced.

The conundrum for healthcare cost reduction advocates is that bundled payments do not represent a one-size-fits-all solution. While well-suited to general orthopedics, where the bundled payment scenario creates the financial incentive to avoid complications and eliminate duplicative or ineffective services, its role in the trauma world is less clear. The very nature of trauma lends itself to unforeseen (read “unpaid for”) complications. As compared to the meticulously planned and executed regimen of general orthopedics, the trauma community suffers when the corseted character of bundled payments disallows for flexibility in compensation for the unpredictable...and trauma is the very essence of unpredictable.

Trauma patients and their dedicated, highly-skilled surgeons deserve better solutions. ▲

*“Patients at risk for delayed healing or nonunion may benefit from implants composed of PEEK-OPTIMA™ Ultra-Reinforced polymer as the carbon fibers provide the strength and fatigue resistance demanded by high-load trauma implant applications.”*

Matthew Cantwell, Trauma Business Leader,  
Invibio Biomaterial Solutions™

## ABOUT THE AUTHOR

### Elizabeth Hofheinz, MPH, MED

Elizabeth Hofheinz is a senior writer at Orthopedics This Week who on two occasions has been honored with the Media Orthopaedic Reporting Excellence Award from The American Academy of Orthopaedic Surgeons. Hofheinz, who has interviewed approximately 900 orthopedic surgeons, is also a freelance editor and writer who collaborates with physicians and PhDs in order to prepare manuscripts for publication in professional journals. She is a contributing writer for *The Rheumatologist*, an official publication of the American College of Rheumatology. In addition, she writes and edits for corporations, public relations firms, the team physician for the Pittsburgh Steelers, LSU Orthopaedics, as well as physicians at Harvard and the Veterans Administration.

Hofheinz holds two master’s degrees: one in public health and another in counseling psychology.



## REFERENCES

1. National Health Expenditure Data: Historical. Retrieved from Centers for Medicare & Medicaid Services website <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical.html>
2. Hussey P, et al. Controlling U.S. Health Care Spending—Separating Promising from Unpromising Approaches. *N Engl J of Med*. 2009; 361:2109-2111.
3. Orthopaedic Research Society website <https://www.ors.org/wp-content/uploads/2016/10/Inside-Innovations-3-16-revised.pdf>
4. Burge R, et al. Incidence and economic burden of osteoporosis-related fractures in the United States, 2005-2025. *J Bone Miner Res*. 2007 Mar;22(3):465-75.
5. Le Manach Y, et al. Outcomes After Hip Fracture Surgery Compared With Elective Total Hip Replacement. *JAMA*. 2015 Sep 15;314(11):1159-66.
6. Burge R, et al. Incidence and economic burden of osteoporosis-related fractures in the United States, 2005-2025. *J Bone Miner Res*. 2007 Mar;22(3):465-75.
7. Kanis JA, et al. A meta-analysis of previous fracture and subsequent fracture risk. *Bone*. 2004 Aug;35(2):375-82.
8. Sathiyakumar V, et al. Adverse Events in Orthopaedics: Is Trauma More Risky? An Analysis of the NSQIP Data. *J Orthop Trauma*. 2015 Jul;29(7):337-41.
9. Mahure, SA et al. Economic Impact of Nonmodifiable Risk Factors in Orthopaedic Fracture Care: Is Bundled Payment Feasible? *J Orthop Trauma*. 2017 Mar;31(3):175-179.
10. Navathe, AS et al. Cost of Joint Replacement Using Bundled Payment Models. *JAMA Intern Med*. 2017;177(2):214-222.
11. Sathiyakumar V, et al. Adverse Events in Orthopaedics: Is Trauma More Risky? An Analysis of the NSQIP Data. *J Orthop Trauma*. 2015 Jul;29(7):337-41.
12. Cummings SR, et al. The future of hip fractures in the United States. Numbers, costs, and potential effects of postmenopausal estrogen. *Clin Orthop Relat Res*. 1990 Mar;(252):163-6.
13. Lakomkin N, et al. The risk of adverse events in orthopaedic trauma varies by anatomic region of surgery: an analysis of fifty thousand four hundred and twenty one patients. *Int Orthop*. (SICOT). 2015;39: 2153.
14. Rodriguez EK, et al. Predictive factors of distal femoral fracture nonunion after lateral locked plating: a retrospective multicenter case-control study of 283 fractures. *Injury*. 2014 Mar;45(3):554-9.
15. Reference derived from peer reviewed and published complications rates for internal fixation requiring revision surgery multiplied by average cost of primary and revision surgery obtained from the National (Nationwide) Inpatient Sample (NIS). The National (Nationwide) Inpatient Sample (NIS) is part of a family of databases and software tools developed for the Healthcare Cost and Utilization Project (HCUP). The NIS is the largest publicly available all-payer inpatient health care database in the United States, yielding national estimates of hospital inpatient stays. Unweighted, it contains data from more than 7 million hospital stays each year. Weighted, it estimates more than 35 million hospitalizations nationally. Developed through a Federal-State-Industry partnership sponsored by the Agency for Healthcare Research and Quality (AHRQ), HCUP data inform decision making at the national, state, and community levels.

\* The testimonial presented has been provided by a practicing orthopedic surgeon. His view and experience are his own and do not necessarily reflect those of others. “Invibio” disclaims any liabilities or loss in connection with the information herein.



**Invibio Ltd.**

Victrex Technology Centre  
Hillhouse International  
Thornton-Cleveleys  
Lancashire  
FY5 4QD, UK

Tel: +44 (0) 1253 898 000  
FAX: +44 (0) 1253 898 001

**Invibio Inc.**

300 Conshohocken State Road  
West Conshohocken, PA  
19428  
USA

Toll Free: 866-INVIBIO (468-4246)  
Tel: (484) 342-6004  
Fax: (484) 342-6005

**For further information please email us at [info@invibio.com](mailto:info@invibio.com)  
or visit our website at:**

**► [Invibio.com](http://Invibio.com)**

Victrex plc and/or its group companies ("Victrex plc") believes that the information in this document is an accurate description of the typical characteristics and/or uses of the product or products, but it is the customer's responsibility to thoroughly test the product in each specific application to determine its performance, efficacy, and safety for each end-use product, device or other application. Suggestions of uses should not be taken as inducements to infringe any particular patent. The information and data contained herein are based on information we believe reliable. Mention of a product in this document is not a guarantee of availability.

Victrex plc reserves the right to modify products, specifications and/or packaging as part of a continuous program of product development. Victrex plc makes no warranties, express or implied, including, without limitation, a warranty of fitness for a particular purpose or of intellectual property non-infringement, including, but not limited to patent non-infringement, which are expressly disclaimed, whether express or implied, in fact or by law.

Further, Victrex plc makes no warranty to your customers or agents, and has not authorized anyone to make any representation or warranty other than as provided above. Victrex plc shall in no event be liable for any general, indirect, special, consequential, punitive, incidental or similar damages, including without limitation, damages for harm to business, lost profits or lost savings, even if Victrex has been advised of the possibility of such damages regardless of the form of action.

Supporting information is available on request for all claims referenced in this document.

Copyright ©2018 Invibio Ltd. INVIBIO™, JUVORA™ PEEK-OPTIMA™, INVIBIO BIOMATERIAL SOLUTIONS™ are trademarks of Victrex plc or its group companies. All rights reserved.