

## A Supply and Demand Analysis of the Orthopaedic Trauma Surgeon Workforce in the United States

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**Background/Purpose:** The number of orthopaedic trauma surgeons (OTS) is increasing in the United States. Recent works have highlighted a growing concern among new orthopaedic trauma graduates over the availability of trauma-only positions, as well as the ability for OTS to develop expertise to properly care for complex injuries due to dilution of case volume. Additional effects include the potential impact on education due to decreased volume at training programs, and financial effects on OTS in the current fee-for-service reimbursement system. Increases in the US population correspond with increased trauma; however, it is not known whether the rate of increase in orthopaedic trauma injuries matches the rate of increase in the number of OTS. The purpose of this study is to investigate recent trends in orthopaedic trauma and to assess whether the increased supply of OTS matches with increased demand for their skills. We hypothesized that the supply of OTS has increased at a comparatively faster rate than demand from 2002-2012.

**Methods:** Supply of OTS was estimated using OTA membership data (active, clinical, associate) as a surrogate. The annual number of operative pelvis and acetabulum fractures reported by American College of Surgeons (ACS)-verified trauma centers in the National Trauma Data Bank (NTDB) was used as a surrogate of demand for OTS. International Classification of Diseases, Ninth Revision (ICD-9) diagnosis and procedure codes were extracted from the NTDB. Cases were included only when both ICD-9 diagnosis and procedure codes for pelvis and acetabular trauma were present, in order to capture only operative injuries. Because surrogates were used to estimate supply and demand, the annual rate of change in OTA membership versus rate of change in operative injuries per NTDB center was compared.

**Results:** From 2002-2012, overall reported operative pelvis and acetabular injuries increased by an average of 21.0% per year. The number of reporting trauma centers increased by an average of 27.2% per year. The number of OTA members increased each year except in 2009, with mean annual increase of 9.8%. The mean number of orthopaedic surgeons per NTDB center increased from 7.98 to 8.58, an average of 1.5% per year. The annual number of operative pelvis and acetabular fractures per NTDB center decreased from 27.1 in 2002 to 19.03 in 2012, following a declining trend of 2.0% per year.

**Conclusion:** In the US from 2002-2012 the number of OTS increased significantly, as did the mean number of orthopaedic surgeons per NTDB center. However, the number of annual operative pelvis and acetabular cases per reporting NTDB center declined. These trends suggest an overall net loss of annual orthopaedic trauma cases per OTS over this 10-year period. This supply and demand analysis suggests that the need for newly trained OTS may be diminishing, and that further monitoring and scrutiny of the orthopaedic trauma workforce is necessary.

**Table 1: Supply and Demand data for practicing orthopaedic traumatologists**

Supply	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total U.S. Orthopaedic Surgeons <sup>1</sup>	-	-	23796	23905	24015	24739	25464	25463	25462	26617	27773
Percent change	-	-	-	0.5%	0.5%	3.0%	2.9%	0.0%	0.0%	4.5%	4.3%
Orthopaedists treating ortho trauma <sup>2</sup>	-	-	1904	1864	1825	1995	2164	3374	4583	4833	5083
Percent change	-	-	-	-2.1%	-2.1%	9.3%	8.5%	55.9%	35.8%	5.5%	5.2%
Total Orthopaedic Surgeons in NTDB <sup>†</sup> centers	-	-	-	-	-	3625	4159	5908	6090	6735	6903
Orthopaedic Surgeons per NTDB center	-	-	-	-	-	7.98	8.30	8.66	8.74	8.91	8.58
Percent change	-	-	-	-	-	-	4.0%	4.4%	0.9%	2.0%	-3.7%
Mean Orthopaedic Surgeons per NTDB centers											
Level 1	-	-	-	-	-	9.5	9.7	9.7	9.8	9.8	10.8
Level 2	-	-	-	-	-	8.8	9.5	9.5	9.9	9.9	9.8
Level ≥ 3	-	-	-	-	-	6.2	5.8	5.9	5.8	5.8	5.1
Unspecified	-	-	-	-	-	7.9	8.6	8.7	8.6	8.9	8.3
Trauma Fellowships Offered	-	-	-	-	-	-	81	81	82	81	78
Graduating trauma fellows	-	-	-	-	-	-	-	69	74	64	70
OTA Members <sup>‡</sup>	343	372	398	430	466	575	641	631	694	748	861
Percent Change	-	8.5%	7.0%	8.0%	8.4%	23.4%	11.5%	-1.6%	10.0%	13.0%	9.8%

**Demand**

Total number of NTDB centers reporting	91	110	124	145	300	454	501	682	697	756	805
Level 1	-	-	-	-	101	104	110	124	119	119	120
Level 2	-	-	-	-	-	107	137	142	147	157	156
Level ≥ 3	-	-	-	-	-	52	61	90	91	92	93
Unspecified	-	-	-	-	-	192	193	326	340	388	436
Operative acetabulum fractures	1243	1368	1652	2137	3234	4673	5578	5904	6370	6639	7260
Operative pelvic fractures	1279	1354	1587	2415	3972	5268	6496	6749	7228	7204	8062
Operative P + A fractures*	2522	2722	3239	4552	7206	9941	12074	12653	13598	13843	15322
Percent change	-	7.93%	18.99%	40.54%	58.30%	37.95%	21.46%	4.80%	7.47%	1.80%	10.68%
Operative P + A cases per NTDB center	27.71	24.75	26.12	31.39	24.02	21.90	24.10	18.55	19.51	18.31	19.03
Percent change	-	-10.71%	5.56%	20.18%	-23.49%	-8.84%	10.1%	-23.0%	5.2%	-6.1%	3.9%

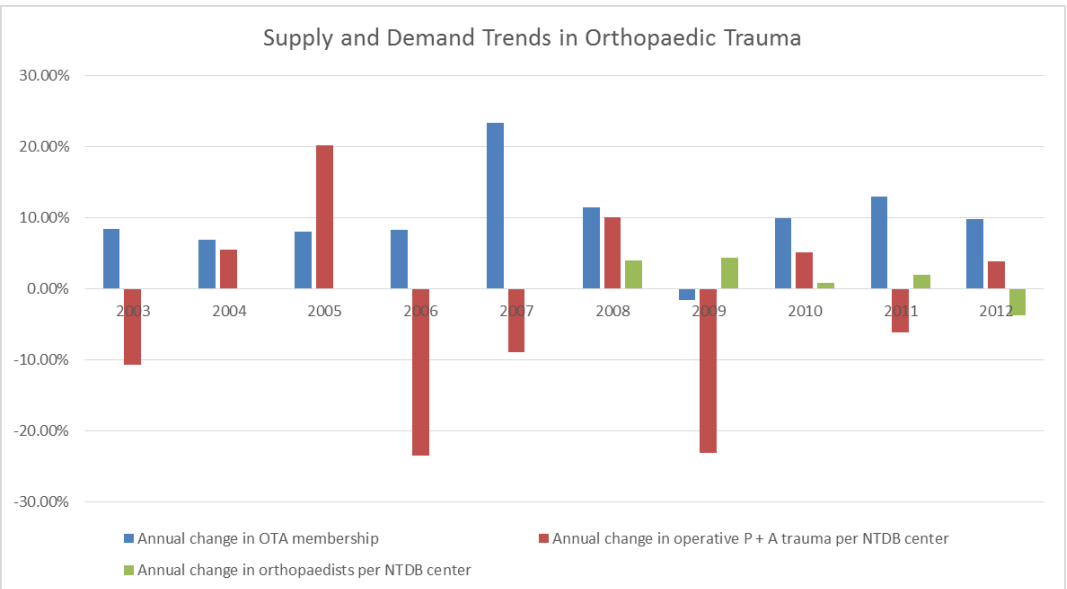
<sup>1</sup> From American Academy of Orthopaedic Surgeon (AAOS) Census Report

<sup>2</sup> AAOS Census data

<sup>†</sup> National Trauma Data Bank

<sup>‡</sup> Orthopaedic Trauma Association: Includes active, associate, and clinical members

\* Pelvic and acetabulum fractures



**Figure 1:** Annual rate of change is shown. Demand trends are estimated by change in operative case volume per NTDB center, supply trends are estimated by change in OTA membership as well as number of total orthopaedic surgeons per center