

**Title:**

Orthobiologic Injection Therapy: An Internet Analysis of New England Clinics and Available Patient Information for Decision Making

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**Conflict(s) of Interest:**

The authors declare there is no conflict of interest.

**Introduction/Background:**

The utilization of injectable biologic therapies in the field of orthopedics has drastically increased over the past decade.<sup>1</sup> While many have embraced these procedures,<sup>2, 3</sup> others remain reluctant.<sup>4-7</sup> Common concerns include lack of regulation and price transparency as well as the ethics of direct-to-consumer marketing.<sup>7-10</sup> The purpose of this study was to investigate the digital landscape of clinics in New England offering injectable orthobiologic therapy from the perspective of potential patients.

**Methods:**

A total of 12 Google searches were performed utilizing the key phrases “orthobiologic clinics” and “platelet rich plasma” for each of the six New England states. Clinic websites were analyzed for six main variables (**Figure 1**). Additionally, general demographic information for each state was collected (**Figure 2**).

**Results:**

Of 108 clinics analyzed (**Figure 2**), 20 informed patients that orthobiologic injections are not covered by insurance, 7 noted potential injection risks, 3 provided total price transparency, 3 provided injection outcome data, and 2 disclosed the type of provider performing the injections. Regarding the education of clinic providers, 57% were Medical Doctor/Doctor of Osteopathic Medicine, 38% were Nurse Practitioners/Physician Assistants, and 5% were Doctors of Podiatric Medicine or Doctors of Chiropractic (**Figure 3**). There was a moderate correlation between number of clinics per state and state population ( $r = 0.85$ , **Figure 4**) and a strong correlation between number of clinics per state and median household income ( $r = 0.89$ , **Figure 5**).

**Discussion:**

Most clinics offering orthobiologic injections provide little information regarding insurance coverage, cost, risk, outcome, or type of provider administering injections. Additionally, clinics offering orthobiologic injections appear to be more concentrated in states with higher median household income. These findings suggest a significant amount of work remains to be done in this field to enhance transparency and improve patient education, as better educated patients make better decisions, leading to better outcomes.<sup>11-13</sup>

**Images/Tables/Charts:**

**Analysis Variables**

Category	Criteria
Education of Provider(s) Employed by Clinic	MD, DO, DPM, DC, NP, PA
States Which Type of Provider Will be Performing Orthobiologic Injections	Yes or No
Cost Transparent	Yes or No
Insurance Coverage for Injections Stated	Yes or No
Potential Risks of Injections Stated	Yes or No
Outcome Data Available for Injections	Yes or No

**Figure 1:** Categories analyzed (left) and fulfillment criteria (right).

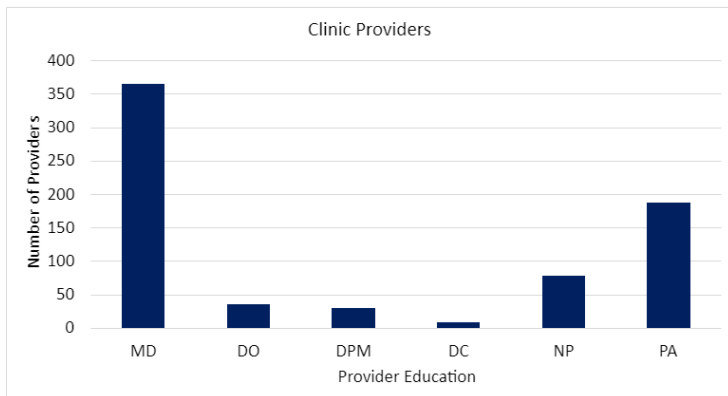
**State Demographics**

State	Population	Number of Clinics	Median Household Income
MA	7,001,399	37	\$96,505
CT	3,617,176	24	\$90,213
RI	1,095,962	21	\$81,370
NH	1,402,054	18	\$90,845
ME	1,395,722	6	\$68,251
VT	647,464	2	\$74,014

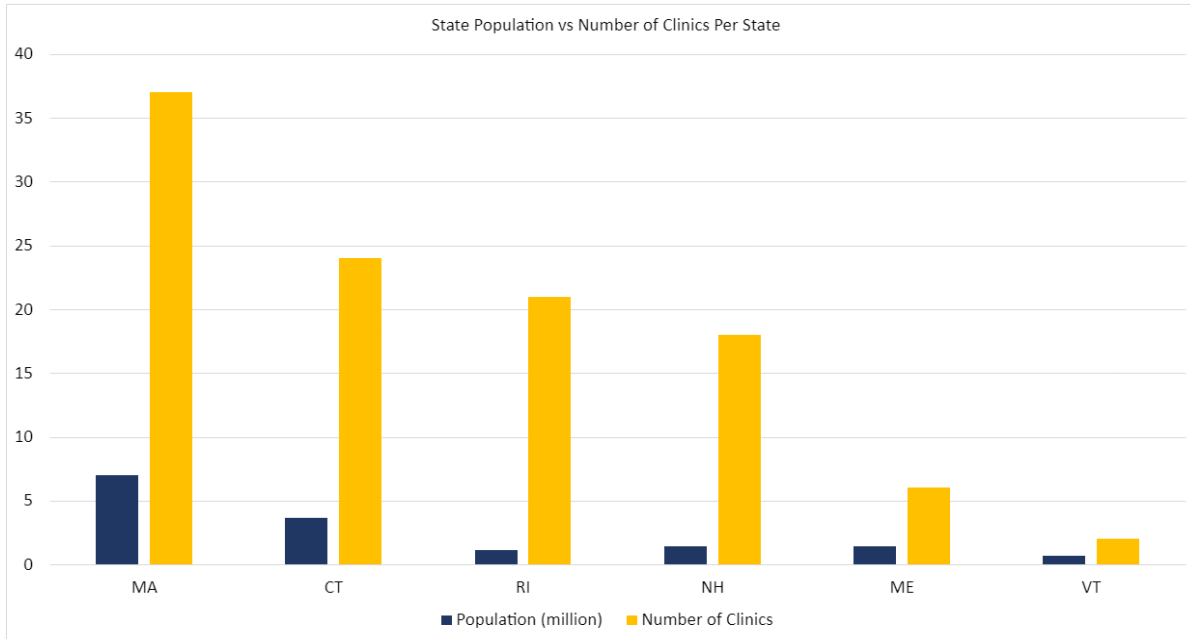
**Figure 2:** Comparison of general demographic information for each of the six New England States.

**Population Information:** US Census Bureau population estimates for 2023

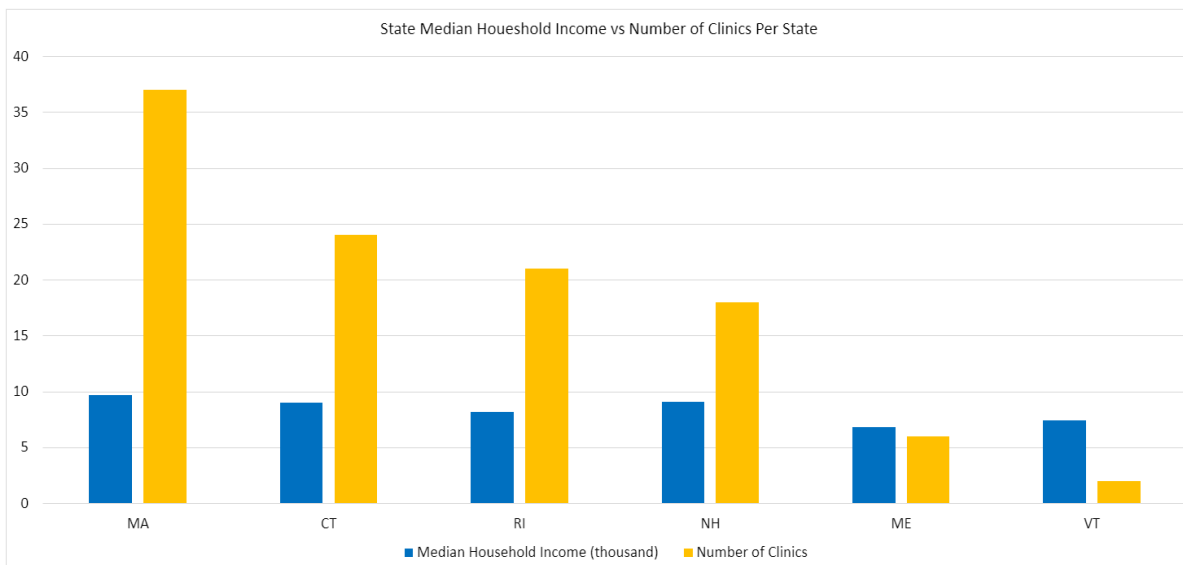
**Median Household Income data:** US Census Bureau 2018-2022



**Figure 3:** Education level and quantity of each type of clinic healthcare provider.



**Figure 4:** Comparison of state population against the number of clinics per state providing orthobiologic injections.



**Figure 5:** Comparison of state median household income against the number of clinics providing orthobiologic injections.

## References:

1. Obana KK, Schallmo MS, Hong IS, Ahmad CS, Moorman CT, 3rd, Trofa DP, Saltzman BM. Current Trends in Orthobiologics: An 11-Year Review of the Orthopaedic Literature. *Am J Sports Med.* 2022;50(11):3121-9. Epub 20210916. doi: 10.1177/03635465211037343. PubMed PMID: 34528456.
2. Centeno CJ, Williams CJ, Hyzy M. Interventional orthopedics in pain medicine practice. *Techniques in Regional Anesthesia and Pain Management.* 2015;19(1-2):26-31.
3. Kyle MR, JD KS, Kyle RR. Orthobiologics: Early Adopters Are Innovating the Regenerative Medicine Industry with Clinical Results. *World stem cell summit• detroit, mi• october.* 2010;4(6).
4. Taliaferro J, Shapiro SA, Montero DP, Shi GG, Wilke BK. Cash-Based Stem-Cell Clinics: The Modern Day Snake Oil Salesman? A Report of Two Cases of Patients Harmed by Intra-articular Stem Cell Injections. *JBJS Case Connect.* 2019;9(4):e0363. doi: 10.2106/JBJS.CC.19.00363. PubMed PMID: 31815806.
5. Piuze NS, Dominici M, Long M, Pascual-Garrido C, Rodeo S, Huard J, et al. Proceedings of the signature series symposium "cellular therapies for orthopaedics and musculoskeletal disease proven and unproven therapies-promise, facts and fantasy," international society for cellular therapies, montreal, canada, may 2, 2018. *Cytotherapy.* 2018;20(11):1381-400. Epub 20181010. doi: 10.1016/j.jcyt.2018.09.001. PubMed PMID: 30316562; PubMed Central PMCID: PMC8487641.
6. Miller MD. OrthoBiologics: Science or Snake Oil? *Clin Sports Med.* 2019;38(1):xi-xii. doi: 10.1016/j.csm.2018.09.004. PubMed PMID: 30466726.
7. Foster TE. Direct-to-Consumer Marketing: The Ethics of Snake Oil Sales? *Am J Sports Med.* 2023;51(5):1133-5. doi: 10.1177/03635465231163567. PubMed PMID: 37002724.
8. Tiao J, Wang K, Herrera M, Ren R, Rosenberg AM, Cassie R, Poeran J. There is wide variation in platelet-rich plasma injection pricing: a United States nationwide study of top orthopaedic hospitals. *Clinical Orthopaedics and Related Research®.* 2022;10.1097.
9. Chu CR, Rodeo S, Bhutani N, Goodrich LR, Huard J, Irrgang J, et al. Optimizing clinical use of biologics in orthopaedic surgery: consensus recommendations from the 2018 AAOS/NIH U-13 conference. *JAAOS-Journal of the American Academy of Orthopaedic Surgeons.* 2019;27(2):e50-e63.
10. Jang K, Berrigan WA, Mautner K. Regulatory Considerations of Orthobiologic Procedures. *Phys Med Rehabil Clin N Am.* 2023;34(1):275-83. Epub 20221017. doi: 10.1016/j.pmr.2022.08.016. PubMed PMID: 36410887.
11. Peterson PN, Shetterly SM, Clarke CL, Bekelman DB, Chan PS, Allen LA, et al. Health literacy and outcomes among patients with heart failure. *Jama.* 2011;305(16):1695-701.
12. Eckman MH, Wise R, Leonard AC, Dixon E, Burrows C, Khan F, Warm E. Impact of health literacy on outcomes and effectiveness of an educational intervention in patients with chronic diseases. *Patient education and counseling.* 2012;87(2):143-51.
13. Riedl D, Schüssler G. The influence of doctor-patient communication on health outcomes: a systematic review. *Zeitschrift für Psychosomatische Medizin und Psychotherapie.* 2017;63(2):131-50.