

### Background

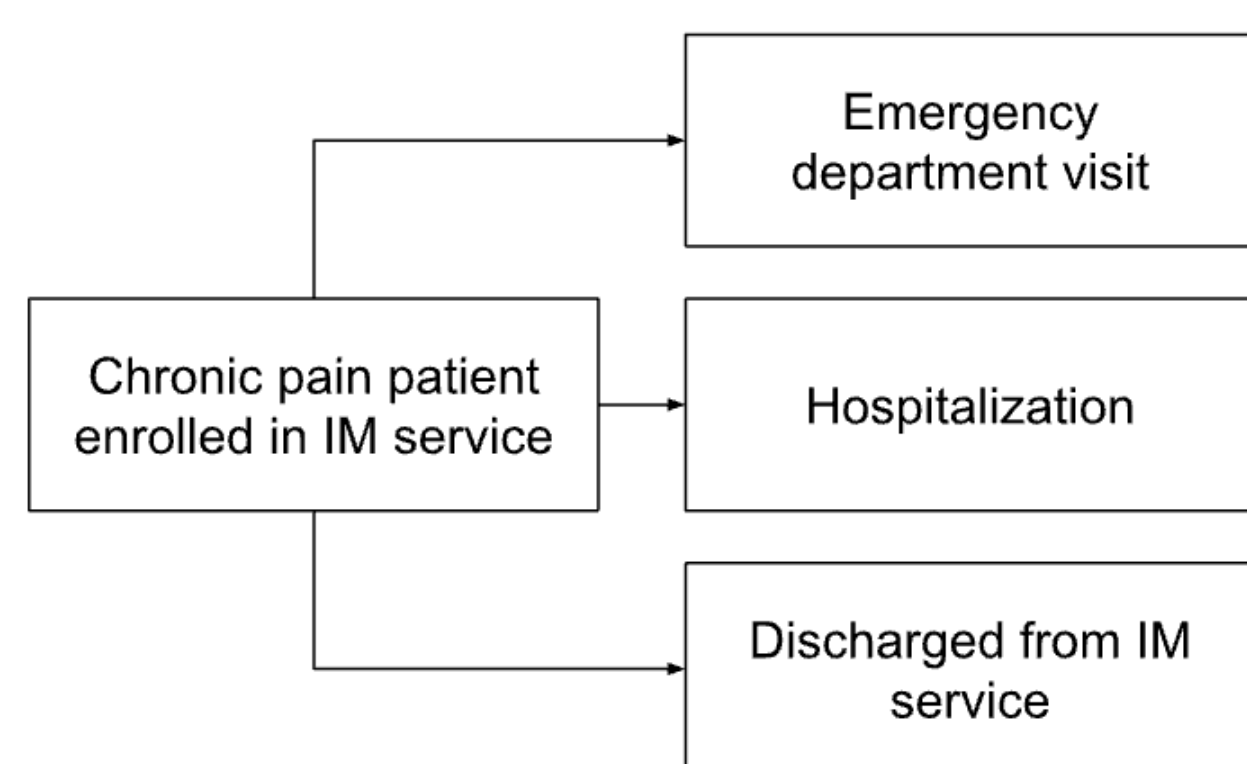
- Pediatric chronic pain contributes significantly to morbidity and an average \$1339 increase per capita, totaling \$11.8 billion in healthcare utilization.<sup>1</sup>
- Integrative Medicine (IM), as a person-centered approach, supports the National Institutes of Health's (NIH) perspective on Whole Person Health (WPH). It brings both conventional and IM approaches to medical treatment through multimodal practices to better treat the person holistically, rather than targeting a list of symptoms.<sup>2,3</sup>
- Literature review has shown that IM practices including acupuncture, yoga, biofeedback, massage and mindfulness can improve a variety of critical health outcomes.<sup>4-7</sup>
- Existing studies highlighted the efficacy, cost-effectiveness, and cost-savings of IM services among adults, but there is a lack literature of pediatric pain.<sup>8</sup>
- Poor insurance reimbursement and institutional support for IM services historically

### Objective

To develop a budget impact model to estimate the institutional costs of implementing common integrative medicine practices among adolescents.

### Method

Figure 1. Decision Tree Model



- A decision tree was used to estimate the reduction in hospitalizations and emergency department (ED) use based on a previously published retrospective analysis.
- Costs were based on hourly compensation rates for licensed professionals administering each service as well as equipment associated with delivery (e.g. acupuncture needles, biofeedback equipment, and sensors).
- Cost of each hospitalization and ED visit was derived from the literature.<sup>9</sup>
- Cost-savings were estimated based on government- and commercial-contracted reimbursement rates for each service.

### Result

Cost Savings Associated with IM Services, Individually and in Combination

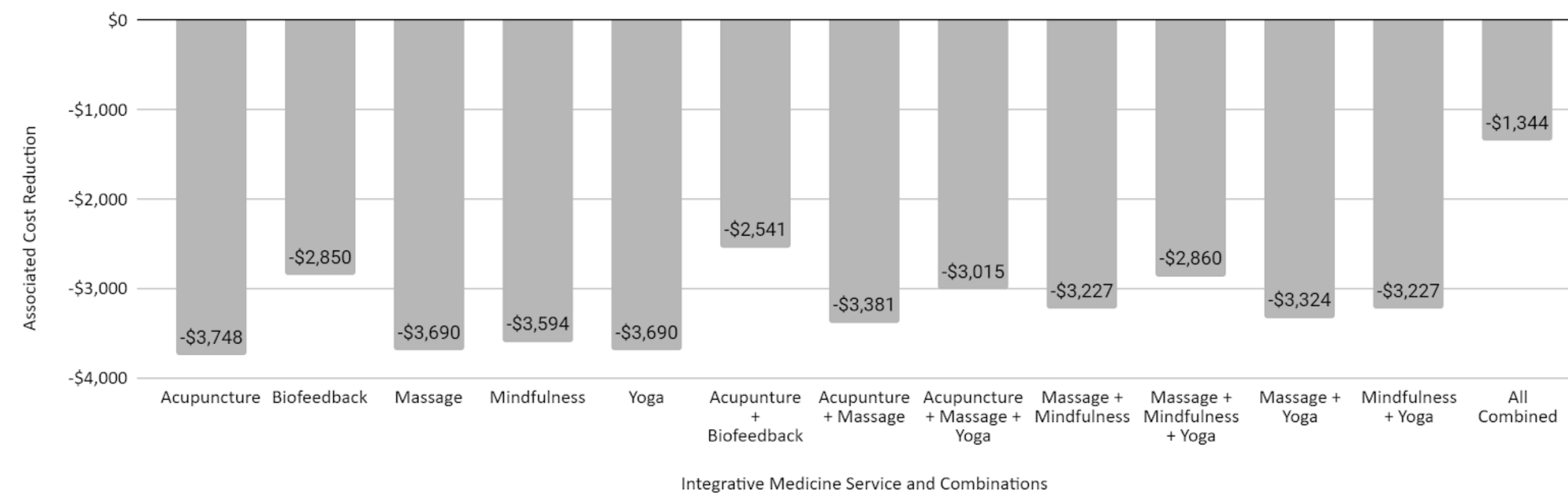


Figure 2. Budget Impact Result. Costs are shown in 2023 USD. This figure presents a comparative analysis of Integrative Medicine (IM) services, detailing the utilization costs before and after implementation, the direct costs of the services, and the net cost impact.

One-Way Sensitivity Analysis: Acupuncture

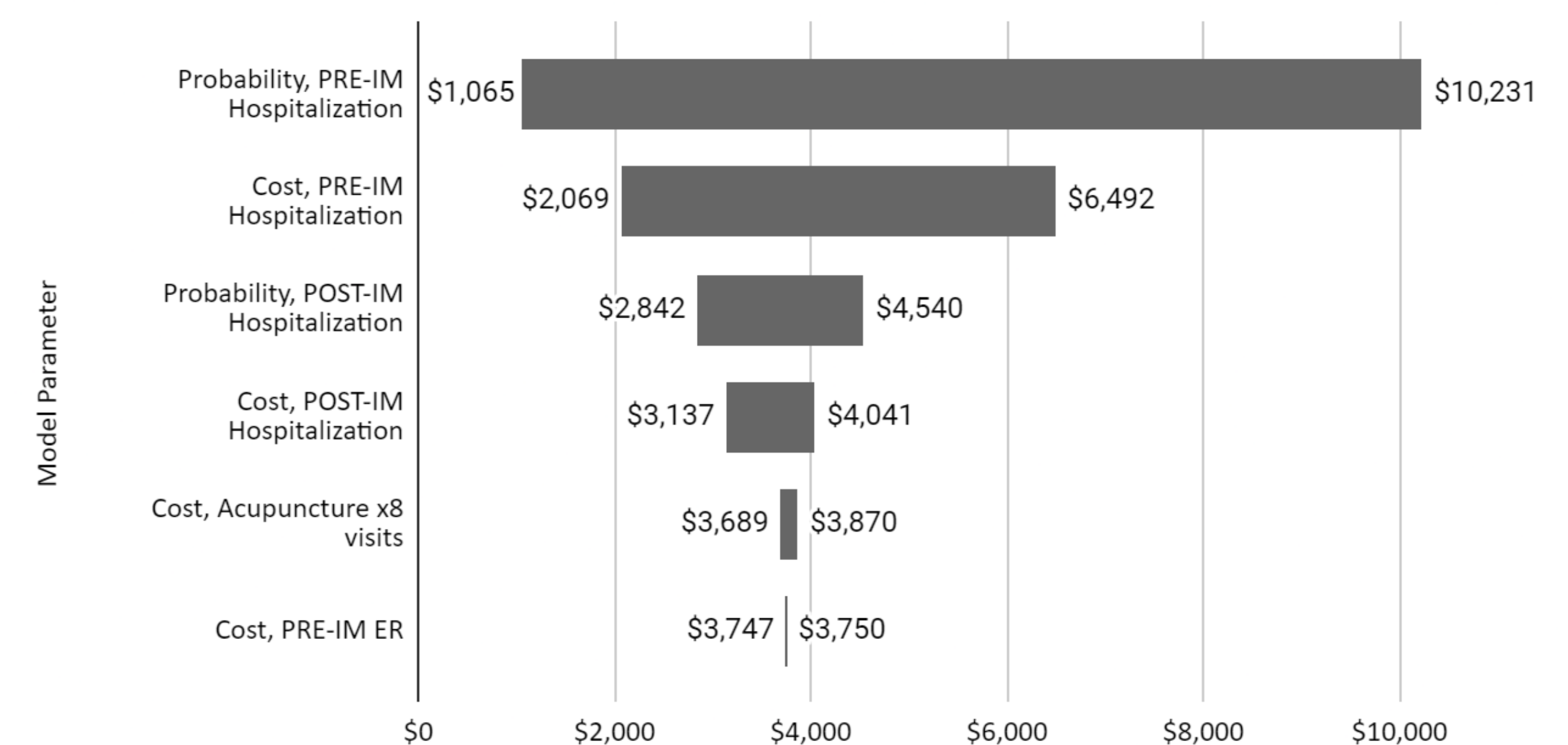


Figure 3. One-way Sensitivity Analysis Result. This tornado diagram illustrates the impact of varying individual model parameters on the cost-savings calculated. Based on the analysis, the probability and cost of hospitalization pre-intervention, followed by the reduction in hospitalization rates and cost post-intervention have the most significant impact on the model results. The cost to provide the service had minimal impact on cost-savings. Results are shown for acupuncture only for clarity, however, these results remain consistent across different modalities.

### Conclusion

There are significant potential cost-savings associated with the use of pain integrative management practices among adolescents with chronic pain. Further investigation will determine if these cost-savings remain robust across different combinations of modalities and heterogeneous patient populations.

### Limitation

- The analysis faces limitations due to the diverse causes of pain among patients, affecting the applicability of a standardized treatment regimen, which was devised from clinical expertise.
- Limited data necessitated the assumption of uniform efficacy across all treatment modalities for hospital and ED visits, despite potential variances in outcomes from individual and combined treatments.

### Discussion

- Currently, most pediatric medical centers across the country offer limited to no IM services due to perceived high upfront costs associated with such practices.
- This analysis assumes that all five interventions equally reduce hospital and ED costs, a simplification due to the lack of data needed to distinguish the specific impacts of each intervention.
- The number of sessions for complete treatment is still exactly unknown, and often hospital environments struggle with space constraints, rather than a specific dose-response relationship. In most cases, 8 sessions are deemed sufficient to determine whether an individual is responding to treatment, but it remains unclear the number of sessions required for a "cure" versus a temporary relief.
- This study disentangles the individual or the cumulative direct impact of each intervention on healthcare utilization without additional prospective data to help isolate these effects.
- There is a compelling argument to be made for implementing such practices in other areas beyond pain and palliative care, which could result in even greater cost savings with the widespread utilization of integrative medicine practices.

### Reference

1. Groenewald CB, Essner BS, Wright D, et al. The Economic Costs of Chronic Pain Among a Cohort of Treatment-Seeking Adolescents in the United States. *J Pain*. 2014;15(9):925-933.
2. Whole Person Health: What You Need To Know. NCCIH. Accessed February 14, 2024. <https://www.nccih.nih.gov/health/whole-person-health-what-you-need-to-know>
3. Bonakdar RA, Sukiennik AW. Integrative Pain Management. Oxford University Press; 2016.
4. Lin YC, Perez S, Tung C. Acupuncture for pediatric pain: The trend of evidence-based research. *Afr J Tradit Complement Altern Med*. 2020;10(4):315-319.
5. Nager AL, Kobylecka M, Pham PK, et al. Effects of acupuncture on pain and inflammation in pediatric emergency department patients with acute appendicitis: a pilot study. *J Altern Complement Med*. 2015;21(5):269-2
6. Kempert H. The Use of Yoga as a Group Intervention for Pediatric Chronic Pain Rehabilitation: Exploring Qualitative and Quantitative Outcomes. *Int J Yoga*. 2020;13(1):55-61.
7. Sibinga EMS, Kemper KJ. Complementary, holistic, and integrative medicine: meditation practices for pediatric health. *Pediatr Rev*. 2010;31(12):e91-e103.
8. Herman PM, Anderson ML, Sherman KJ, et al. Cost-Effectiveness of Mindfulness-Based Stress Reduction vs Cognitive Behavioral Therapy or Usual Care among Adults with Chronic Low-Back Pain. *Spine*. 2017;42(20):1511.
9. Mahrer NE, Gold JI, Luu M, et al. A Cost-Analysis of an Interdisciplinary Pediatric Chronic Pain Clinic. *J Pain*. 2018;19(2):158-165.