

# Time-driven, Activity-based Costing of Presurgical Infant Orthopedics: A Critical Component of Establishing Value of Latham Appliance and Nasoalveolar Molding

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## Background

Value-based health care reform requires assessment of outcomes and costs of medical interventions. In left-care, pre-surgical infant orthopedics (PSIO) is still be evaluated for clinical benefits and risks; however, the cost of these procedures has been largely ignored. **This study aims to use robust accounting methods to quantify the cost of providing two types of PSIO, Latham and Nasoalveolar molding (NAM).**

## Methods

- Prospective study of patients with non-syndromic cleft lip and/or palate (CL/P) who underwent PSIO between 2017-2019 at two academic centers.
  - Boston Children's Hospital: Georgiade-Latham ("Latham") device
  - Duke Children's Hospital: Nasoalveolar Molding (NAM)
- Utilized TDABC methodology to assess operational efficiency and quality control
  - Measures time required by each component of care, converting time to cost and summing resources spent across defined period of treatment.
- Travel costs were used as a proxy of cost burden imposed on families.

### Pre-Surgical Infant Orthopedics:

#### Georgiade-Latham ("Latham") Device

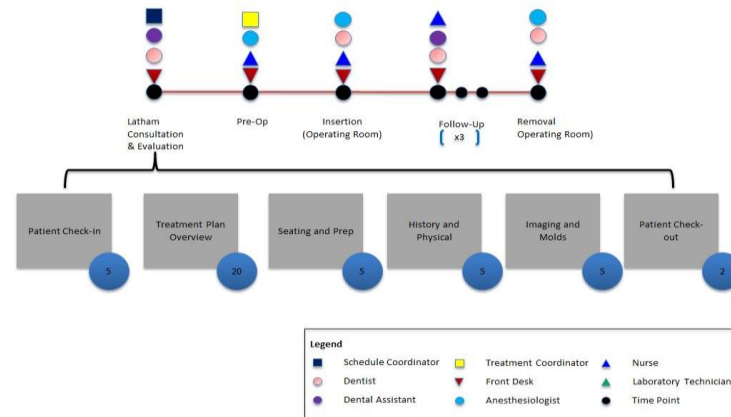


#### Nasoalveolar molding (NAM)

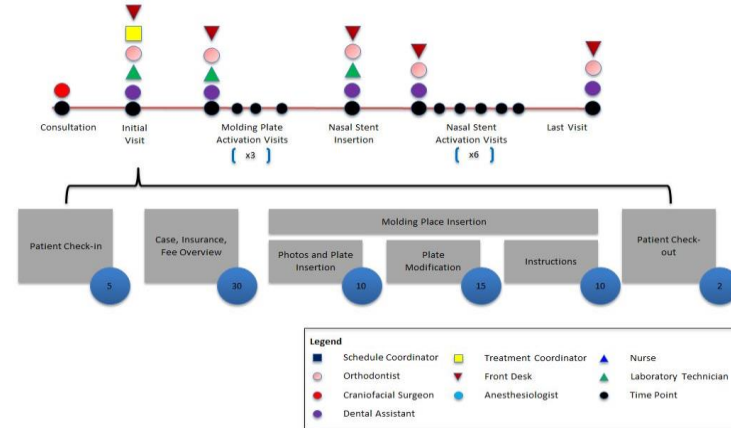


## Process Mapping

### Latham Appliance Timeline



### Nasoalveolar Molding (NAM) Timeline



## Results

Treatment	Personnel	Equipment	Facility	Travel*	Total Cost
<b>Latham (Average)</b>	\$1041 (13.8 %)	\$637 (8.4 %)	\$4,871 (64.5 %)	\$1,004 (13.3 %)	<b>\$7,553</b>
Unilateral	\$901	\$593	\$4,479	\$918	\$6,891
Bilateral	\$1,291	\$700	\$5,798	\$1,071	\$8,860
<b>NAM (Average)</b>	\$364 (14.3 %)	\$151 (5.9 %)	\$300 (11.8 %)	\$1,726 (67.9 %)	<b>\$2,541</b>
Unilateral	\$320	\$116	\$260	\$1,423	\$2,120
Bilateral	\$442	\$196	\$375	\$2,035	\$3,048

\*Using hypothetical 75-mile travel distance.

- Total cost of PSIO treatment ranged from \$2100 to \$8900**
- Peri-operative facility and personnel costs accounted for the majority of costs for Latham**
- Outpatient orthodontic costs accounted for the majority of costs for NAM**
- Equipment costs were low for both modalities of PSIO**
- Family-borne travel costs were greater for NAM due to more frequent clinical visits, and this was very sensitive to distance**
- Bilateral PSIO cost more than unilateral PSIO for both NAM and Latham**

## Conclusions

Both forms of PSIO can be provided for relatively low cost. The major difference in costs are attributable to operative placement of the Latham device and post-operative hospitalization. Costs to family, in particular travel cost, for NAM are often higher due to frequent clinical encounters required. Future investigation should focus on whether outcomes achieved by PSIO justify the \$2100-\$8900 expenditure for these adjunctive procedures. Understanding these costs can help in advocating for this vulnerable patient population.

## Authors and Disclosures

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