

# **Allergen Immunotherapy Significantly Reduces Health Care Costs Among U.S. Adults with Allergic Rhinitis: A Retrospective Matched Cohort Study Jointly Funded by AAAAI and ACAAI**

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- Members of the Academy and College

# Background

- ➔ To date, only 4 U.S. studies have examined the comparative clinical and economic effectiveness of SIT. Of these, 3 reported a benefit for SIT.
- ➔ Donahue 1995:<sup>1</sup> Patients with AR completing a full course of SIT (≥61 administrations over 3.5 years) **incurred higher health care costs** than those who did not complete a full course of SIT (findings were not adjusted for baseline differences in disease severity and health care costs).<sup>1</sup>
- ➔ Sullivan 1996:<sup>2</sup> \$8,851 over 5 years = **\$1,770 annual benefit for SIT** vs symptomatic drug treatment among patients with AR.<sup>2</sup>
- ➔ Hankin 2008:<sup>3</sup> \$401 over 6 months = **\$802 median annual benefit for SIT** (children with AR in the 6 months after SIT discontinuation versus 6 months prior to SIT initiation).<sup>3</sup>
- ➔ Hankin 2010:<sup>4</sup> \$1,625 over 18 months = **\$1,218 mean annual benefit for SIT** among children with AR versus matched controls who did not receive SIT.<sup>4</sup>

1. Donahue JG, Greineder DK, Connor-Lacke L, et al. Utilization and cost of immunotherapy for allergic asthma and rhinitis. *Ann Allergy Asthma Immunol* 1999;82:339-47.
2. Sullivan TJ, Selner JC, Patterson R, et al. Expert care and immunotherapy for asthma. A review of published studies with emphasis on patient outcome and cost: American College of Allergy, Asthma and Immunology; November 1996.
3. Hankin CS, Cox L, Lang D, et al. Allergy immunotherapy among Medicaid-enrolled children with allergic rhinitis: Patterns of care, resource use, and costs *J Allergy Clin Immunol* 2008;121:227-32.
4. Hankin CS, Cox L, Lang D, et al. Allergen immunotherapy and health care cost benefits for children with allergic rhinitis: a large-scale, retrospective, matched cohort study. *Ann Allergy Asthma Immunol* 2010;104:79-85.

# Methods

- ➔ **Florida Medicaid Database.** Data were obtained from computerized Florida Medicaid (July 1997 to June 2008). claims records. This dataset provides HIPAA-compliant unique enrollee identifiers so that specific patients' outcomes can be evaluated over time. Data include patient demographics (e.g., sex, age, and race/ethnicity); family identifiers (e.g., mother-child); health services use (ICD diagnoses and HCPCS/CPT treatment codes) by settings, dates, and physician specialties; drug claims (NDCs with doses, quantities filled, dates of fills); and primary and secondary insurers (e.g., Medicaid with Medicare or self-pay).
- ➔ **Statistical Analysis.** We used t-tests to compare continuous variables and chi-square tests for categorical variables. If the overall test was significant, additional analyses were conducted to compare subgroups. Logistic regression was used to calculate likelihood estimates for variables associated with SIT utilization and Cox proportional hazard analysis to evaluate predictors of premature SIT discontinuation.

# Methods

➔ **Sample Selection:** Among those enrolled in Florida Medicaid between 1997-2008, we identified adults (age  $\geq 18$  years) who were newly diagnosed with AR and had sufficient data for baseline (1 year prior to index AR diagnosis) and follow-up (4 years following index AR diagnosis) analysis. Patients who received SIT must have been previously naïve to treatment (no SIT in the 1 year preceding index AR diagnosis) and received SIT following (rather than preceding) the index AR diagnosis.

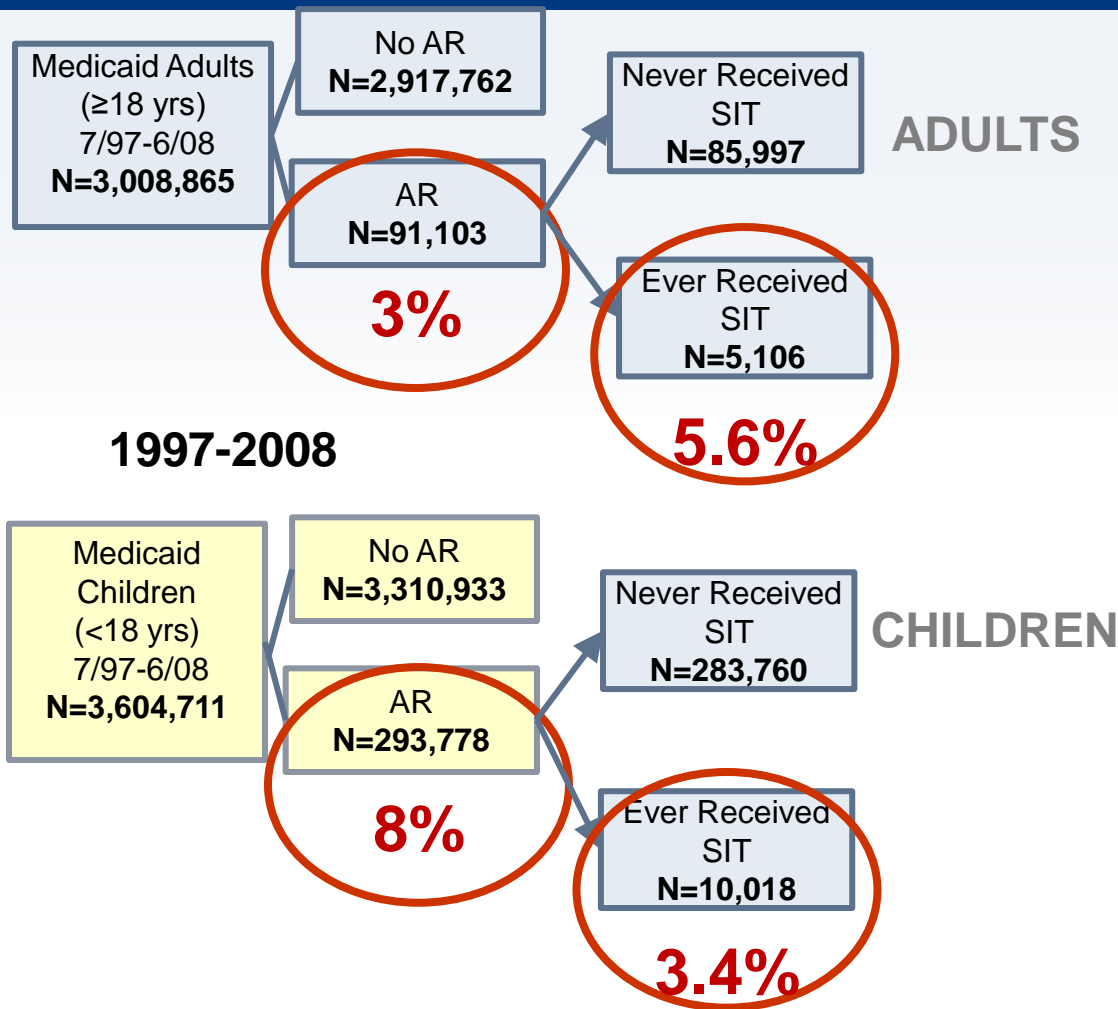
## Definitions of Terms

- **AR**
  - ICD-9 477.X
- **SIT**
  - CPT 95115, 95117, 95120, 95125, 95144, 95165, 95180, 95199
- **Comorbid allergy-related illness**
  - **Asthma**
    - 493.X
  - **Atopic dermatitis**
    - ICD-9 691.8
  - **Conjunctivitis**
    - ICD-9 372.X
- **Comorbid illness severity (Charlson Comorbidity Index)<sup>1</sup>**
  - None to mild
  - Moderate
  - Severe
- **Premature SIT discontinuation**
  - SIT <3 years
- **Newly diagnosed AR**
  - Index AR preceded by a full year in which no AR diagnoses occurred
- **De novo SIT**
  - New AR diagnosis and 1<sup>st</sup> SIT claim followed (rather than preceded) newly diagnosed AR
- **Buildup phase**
  - 1<sup>st</sup> 6 months of SIT
- **Maintenance phase**
  - SIT following build-up phase

# Background: Florida Medicaid (1997-2008)

- Computerized Florida Medicaid claims records contain
  - HIPAA-compliant unique patient identifiers
  - Basic demographics (e.g., sex, age, and race/ethnicity)
  - Family identifiers (e.g., mother-child)
  - Health services use
    - ICD diagnosis and HCPCS/CPT treatment codes
      - By settings, dates, physician specialties
    - NDC prescription drug claims
      - Include doses, quantities filled, dates of fill
  - Primary and secondary insurers (e.g., Medicaid with Medicare or self-pay )

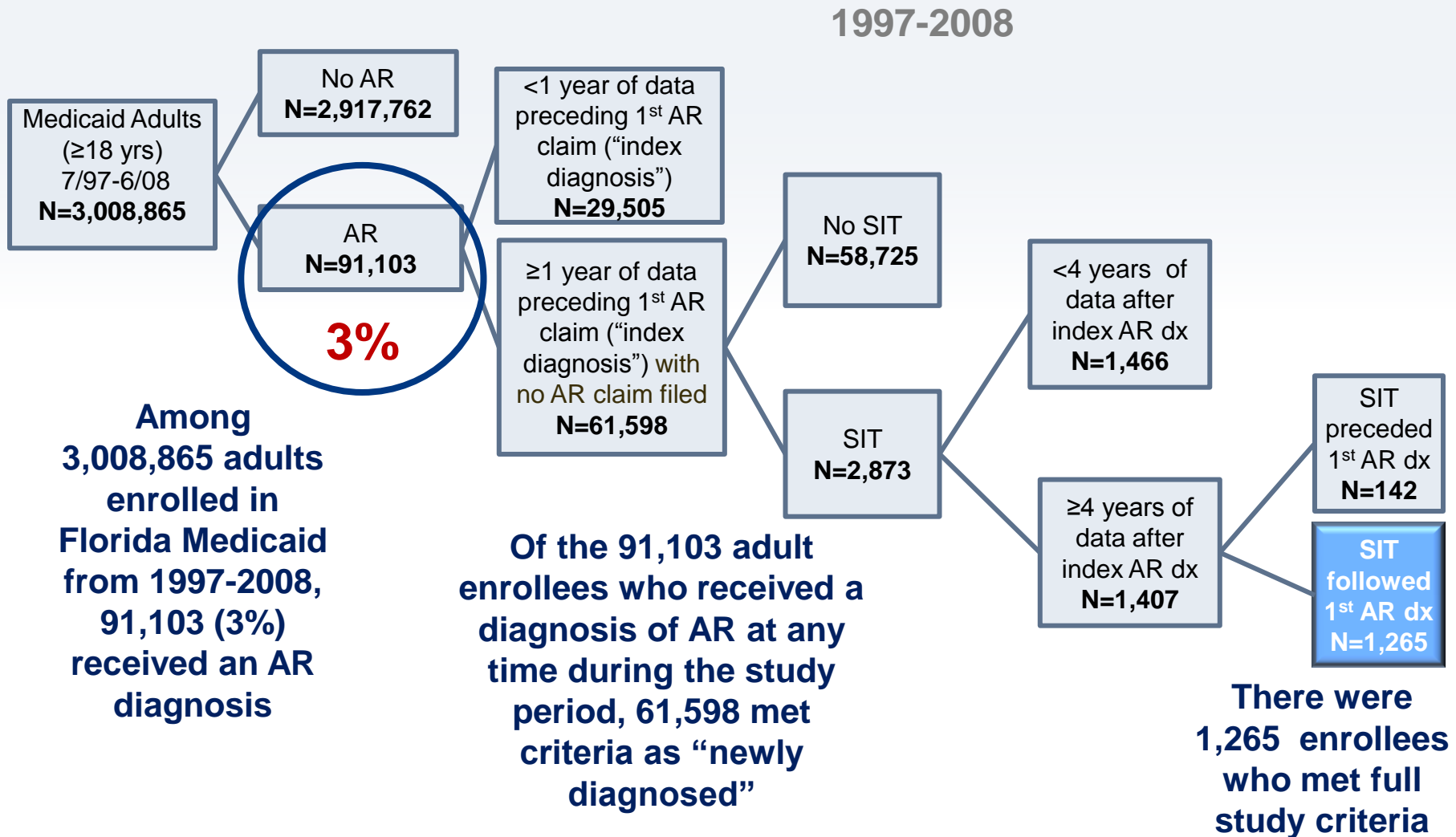
# Sample Identification



## Definitions of Terms

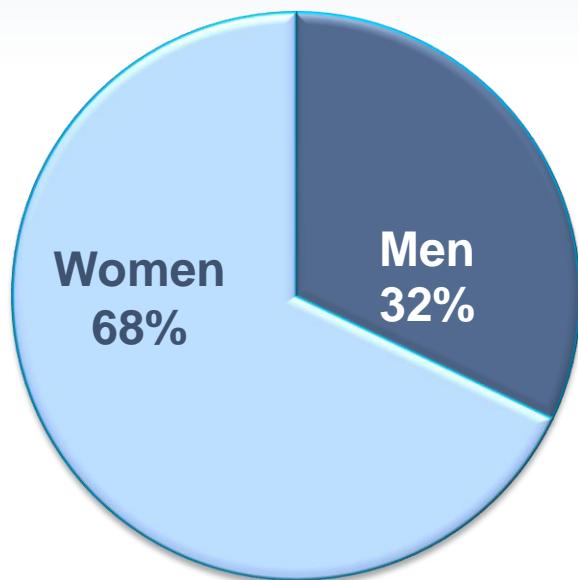
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# Identification of Adults Newly Diagnosed with AR Who Received *De Novo* SIT

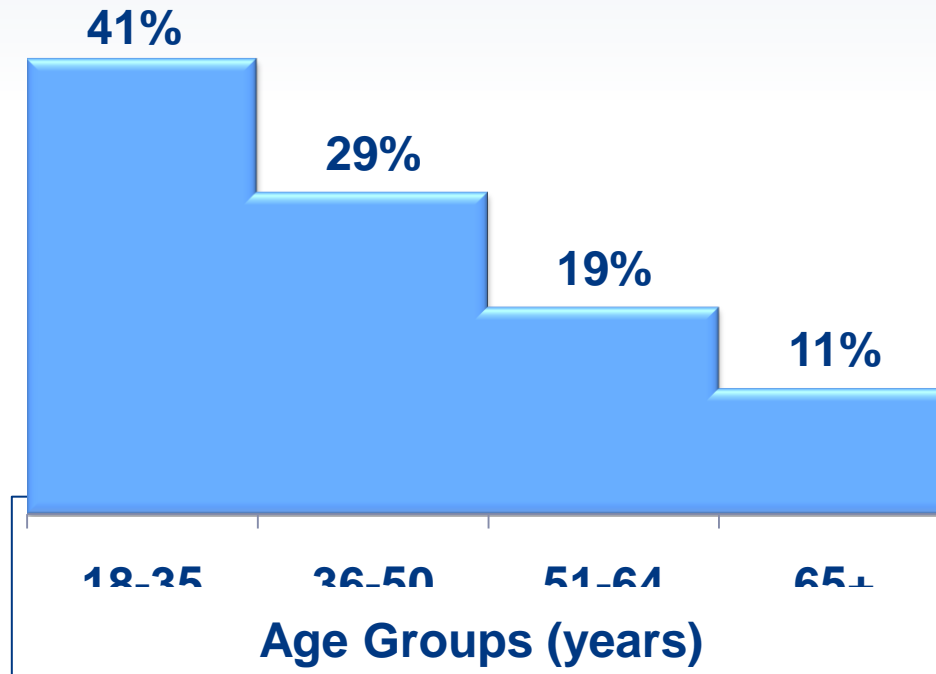


# AMONG 61,598 ADULT PATIENTS NEWLY DIAGNOSED WITH AR

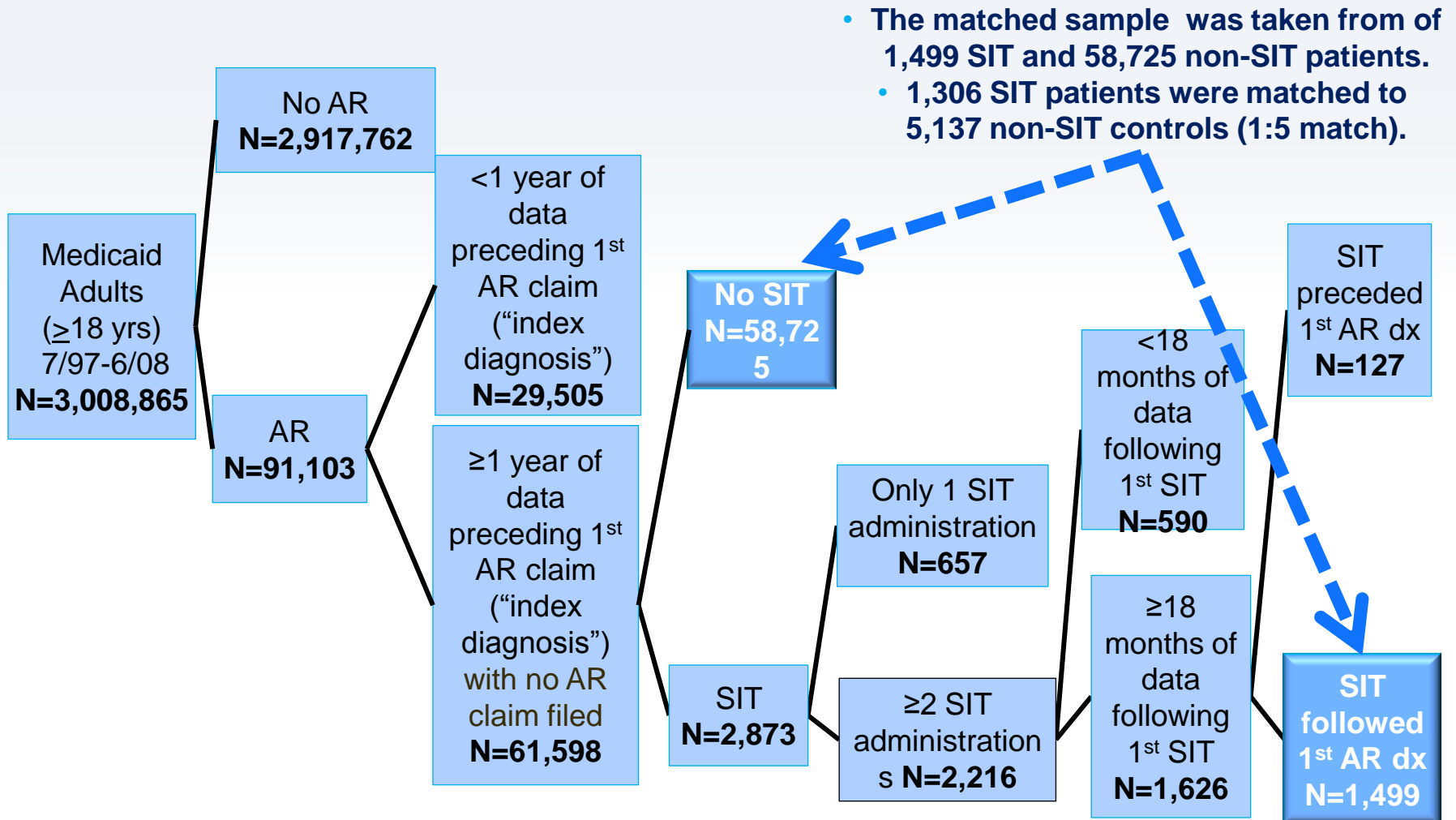
Approximately 1/3 (32%) were men



Nearly 3/4 (70%) were 18-50 years of age



# Matched Sample



- The matched sample was taken from of 1,499 SIT and 58,725 non-SIT patients.
- 1,306 SIT patients were matched to 5,137 non-SIT controls (1:5 match).

# AMONG 1,265 ADULTS WHO MET FULL STUDY CRITERIA AND RECEIVED SIT

<b>Time from Index AR Diagnosis to SIT Initiation</b>			
<b>Adults (N=1,265)</b>	<b>N</b>	<b>%</b>	<b>Cum %</b>
<b>Same day</b>	<b>494</b>	<b>39 %</b>	<b>39%</b>
<b>&lt;6 month</b>	<b>401</b>	<b>32%</b>	<b>71%</b>
<b>6 to &lt;12 months</b>	<b>66</b>	<b>5%</b>	<b>76%</b>
<b>1 to &lt;2 years</b>	<b>90</b>	<b>7%</b>	<b>83%</b>
<b>2 to &lt;3 years</b>	<b>64</b>	<b>5%</b>	<b>88%</b>
<b>3 to &lt;4 years</b>	<b>47</b>	<b>4%</b>	<b>92%</b>
<b>≥4 years</b>	<b>103</b>	<b>8%</b>	<b>100%</b>
<b>Mean (SD)</b>	<b>324 (612) days</b>		
<b>Median</b>	<b>12 days</b>		

**Less than  
1/4 (24%)  
initiated  
treatment ≥1  
year after 1<sup>st</sup>  
AR dx.**

# AMONG 1,265 ADULTS WHO MET FULL STUDY CRITERIA AND RECEIVED SIT

SIT Duration			
Adults (N=1,265)	N	%	Cum %
Only 1	230	18%	18%
<6 month	379	30%	48%
6 to <12 months	127	10%	58%
1 to <2 years	170	13%	72%
2 to <3 years	121	10%	81%
3 to <4 years	67	5%	87%
≥4 years	171	14%	100%
Mean (SD)	552 (761) days		
Median	217 days		

*Only about 1/5 (19%) completed 3 or more years of treatment.*

## Mean, Per-Patient, 18-Month Cost Differences: SIT versus Matched Controls (Negative values denote savings conferred by SIT)

Health Services	TIME FROM SIT INITIATION			
	3 months	6 months	12 months	18 months
Pharmacy	-\$151 <i>P</i> <.0001	-\$246 <i>P</i> <.0001	-\$454 <i>P</i> <.0001	-\$685 <i>P</i> <.0001
Outpatient (Including SIT)	-\$248 <i>P</i> <.0001	-\$477 <i>P</i> <.0001	-\$943 <i>P</i> <.0001	-\$1,433 <i>P</i> <.0001
Outpatient (Excluding SIT)	-\$341 <i>P</i> <.0001	-\$626 <i>P</i> <.0001	-\$1,173 <i>P</i> <.0001	-\$1,715 <i>P</i> <.0001
Inpatient	-\$4,207 <i>NS</i>	-\$2,340 <i>NS</i>	-\$2,687 <i>P</i> =.02	-\$4,444 <i>P</i> =.003
<b>TOTAL</b>	<b>-\$1,257</b> <i>P</i> <.0001	<b>-\$2,382</b> <i>P</i> <.0001	<b>-\$4,687</b> <i>P</i> <.0001	<b>-\$7,286</b> <i>P</i> <.0001

\*1,306 SIT patients matched to 5,137 non-SIT patients on age at AR diagnosis; gender; race/ethnicity; and the presence of asthma, conjunctivitis, or dermatitis.

*NS*=not significant.

## Discussion

- In previous research that examined 10 years of Florida Medicaid data (1997-2007), we reported that children who were newly diagnosed with AR and who subsequently received SIT incurred significantly lower 18-month mean pharmacy, outpatient (exclusive or inclusive of SIT) and total health care costs compared to matched controls with AR who did not receive SIT. These significant cost savings occurred within 3 months of SIT initiation, and continued to increase over the 18-month study period.

### CHILDREN: Net Savings Conferred (SIT Group Minus Non-SIT Group)

HEALTH SERVICES	Δ AT 3 MONTHS	Δ AT 6 MONTHS	Δ AT 12 MONTHS	Δ AT 18 MONTHS	P VALUE (BETWEEN GROUP DIFFERENCES)
PHARMACY	-\$44	-\$68	-\$107	-\$208	<i>P</i> < .001 at all time points
OUTPATIENT (WITH SIT)	-\$405	-\$691	-\$1,131	-\$1,519	
OUTPATIENT (WITHOUT SIT)	-\$170	-\$281	-\$529	-\$765	
INPATIENT	-\$803	\$303	-\$1,764	-\$513	NS at any time point
<b>TOTAL</b>	<b>-\$248</b>	<b>-\$527</b>	<b>-\$1,061</b>	<b>-\$1,625</b>	<b><i>P</i> &lt; .001</b>

\*Matched on age at AR diagnosis; gender; race/ethnicity; comorbid illness burden; and the presence of asthma, conjunctivitis, or dermatitis.

# Discussion

- The current findings are even more compelling than those previously reported for children:
- Adults newly diagnosed with AR who subsequently initiated SIT not only incurred significantly lower pharmacy, outpatient (with or without SIT), and total health care costs within 3 months of treatment, but they also incurred significantly lower inpatient costs within 12 months of treatment initiation.
- These significant cost savings took place across all settings of care despite the fact that only 19% of adults who received SIT completed the generally recommended minimum 3-year course of treatment.

# Conclusion

- In this era of U.S. health care reform, where comparative clinical and economic effectiveness research is being called upon to guide best practices, and where high cost treatments for AR and asthma are burgeoning, our findings have important health care policy implications.
- Annual U.S. direct health care expenditures for AR currently exceed \$13 billion, and prescription medications, which provide only temporary symptomatic relief, account for nearly 60% of these direct costs. SIT remains a much underused treatment, despite research documenting its unique, immune-modifying benefits.
- Efforts to increase identification of appropriate patients, improve access to care, and enhance patient adherence to treatment may offer substantial clinically and economically meaningful advantages.