Examining Early Preventive Dental Visits: The North Carolina Experience

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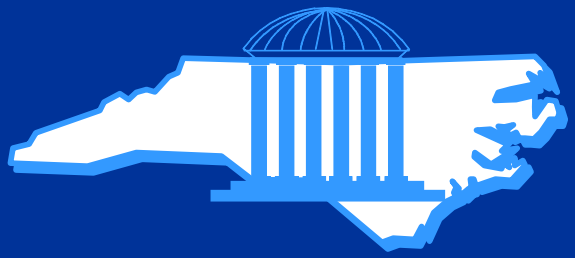

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Early Childhood Caries

- 38% of kindergarten children have experienced dental decay and 25% of this is untreated dental decay.
- Most children in NC covered by Medicaid insurance have limited access to dental care and this is especially true for preschool children.
- Among Medicaid-covered children aged 1-5 years in 1998, while 68% received medical services only 12% received dental services.

Consequences of ECC

- Significantly more likely to weigh less than 80% of their ideal body weight and suffer from failure to thrive.
- Children's hours lost from school and parents' hours lost from work.
- The lost hours disproportionately burden lower income, minority, and non-insured children.

Early Dental Visits Results in Cost-Savings

- In theory, early dental visits have the potential to reduce children's future dental risks and thus improve oral health and reduce oral health costs.
- The estimated annual dental bill in the US to restore children's decayed teeth exceeds $12 billion, making it one of the single most expensive uncontrolled diseases of childhood.
- Children less than 6 years of age enrolled in Medicaid and treated for ECC in a hospital setting represent less than 5% of those receiving dental care but consume 25% to 45% of the dental resources.

Anticipatory Guidance

- **Definition**: process of providing practical developmental appropriate information about children's health to prepare parents for physical milestones
- Like well-child medical visits, one of the cornerstones of the infant dental visit is to prepare parents for future dental milestones and age specific needs

North Carolina Study

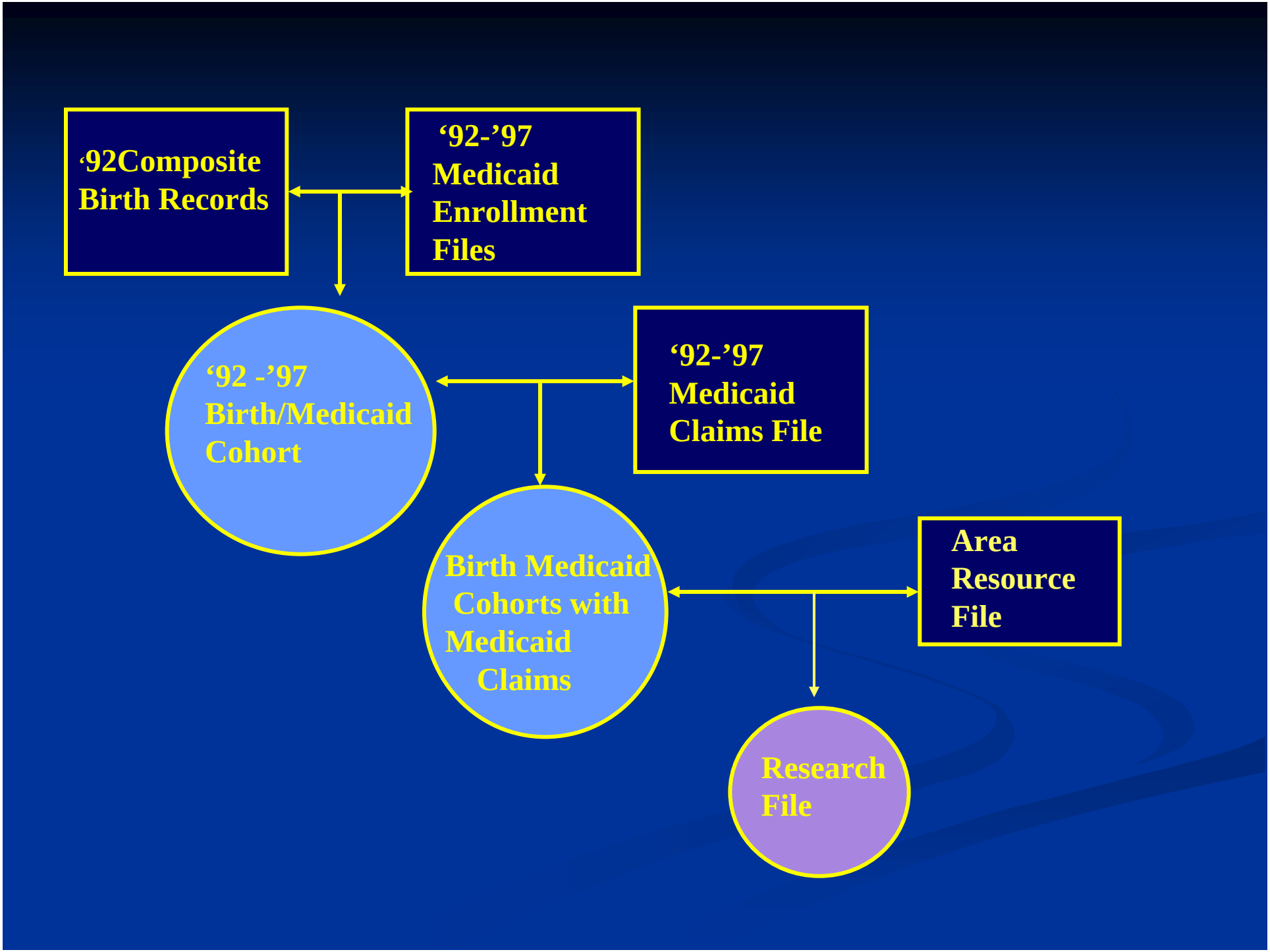
Savage, Lee, Kotch and Vann, *Pediatrics* , 2005

- Characterize the age of the first preventive dental visit in a large population of preschool children at high risk for dental caries
- Examine the effects of age of the first preventive dental visit on subsequent use of dental services
- Examine the effects of age of the first preventive dental visit on dentally-related costs Medicaid children born in 1992.

North Carolina Study

Savage, Lee, Kotch and Vann, *Pediatrics* , 2005

- Five-year longitudinal cohort study.
- Medicaid children born in 1992.
- Data sets
  - NC composite birth records from the 1992 calendar year.
  - Individual Medicaid- eligibility files for all children born in 1992 and continuously enrolled in the Medicaid program between 1992-97.
  - Medicaid dental claims data covering the period 1992-97 (concluding on the child's fifth birthday in 1997).
  - Area Resource File


'92Composite Birth Records
'92-'97 Medicaid Enrollment Files
'92 -'97 Birth/Medicaid Cohort
'92-'97 Medicaid Claims File
Birth Medicaid Cohorts with Medicaid Claims
Area Resource File
Research File

Cohort Exclusion Criteria

Exclusion criteria

- Infant deaths and multiple births
- Children ever institutionalized
- Children not continuously enrolled throughout the study period

The resulting analysis file contained 49,795 children on Medicaid born in 1992

Dependent Variables

- Subsequent visit:
  - Diagnostic/Preventive
  - Restorative
  - Emergency
- Dentally-related costs:
  - Cost of dental procedure
  - Hospital costs due to dental treatment

Independent Variables

- Age of the first dental visit (major independent variable).
- Education.
- Maternal age.
- Number of dentists per population per county.
- Race.
- Previous non-preventive dental visit.

Statistical Analysis

Statistical methods were based on the nature of the units of analysis and the outcome variables:

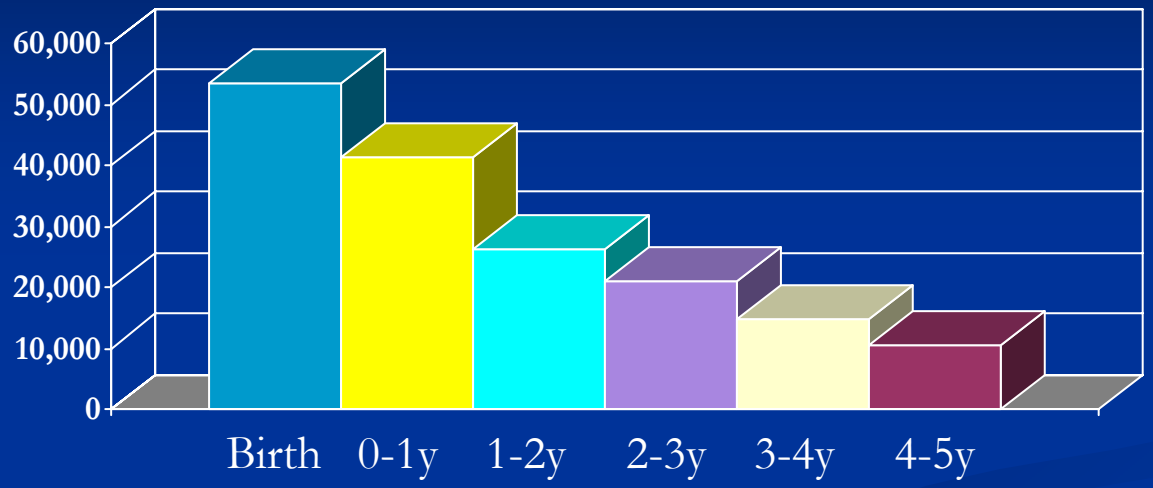
- type of subsequent visits.
- dentally-related costs.

P-value less than 0.05 was considered statistically significant.

Statistical Analysis

- Because our outcome variable for ***type*** of dental visit was non-continuous, we used a **multivariate logistic regression model** that sought to determine the influence an early preventive visit had on subsequent dental visits.
- Because ***dentally-related costs*** were continuous variables, we relied upon a **multivariate linear regression model**.
- All analysis techniques were employed using the STATA-7 statistical package (Stata Corporation; College Station, TX 2002)

Study Sample



- 17% of the 53,591 children born on Medicaid in 1992 remained on Medicaid over the five years of our study period.
- The sample included the 9,204 children.

Characteristics of Study Population

- Average maternal age was 23 years.
- Average maternal educational level was the 11th grade.
- 73% of mothers were unmarried.
- 69% of children were nonwhite.
- The average number of dentists/10,000 people was seven.

Age of the First Dental Visit

- None of the study variables including mother's age, mother's education, unmarried mothers, nonwhite, and dentists/10,000 were statistically significant for a preventive visit by age 1.
- Being nonwhite had a negative correlation and was significant for a preventive visit by age 2, 3, and 4.
- Dentists/10,000 had a positive correlation and was significant for a preventive visit by age 3, 4, and 5.

Effects of Age of the First Preventive Dental Visit on Subsequent Use of Dental Services

Effect of Preventive Visit by Age 1 on Subsequent Dental Utilization

	Effect	*P*-value
Subsequent Preventive Visit	+	0.00
Subsequent Restorative Visit	+	0.18
Subsequent Emergency Visit	+	0.61

Effects of Age of the First Preventive Dental Visit on Subsequent Use of Dental Services

Effect of Preventive Visit by Age 2 on Subsequent Dental Utilization

	Effect	*P*-value
Subsequent Preventive Visit	+	0.00
Subsequent Restorative Visit	+	0.00
Subsequent Emergency Visit	+	0.00

Effects of Age of the First Preventive Dental Visit on Subsequent Use of Dental Services

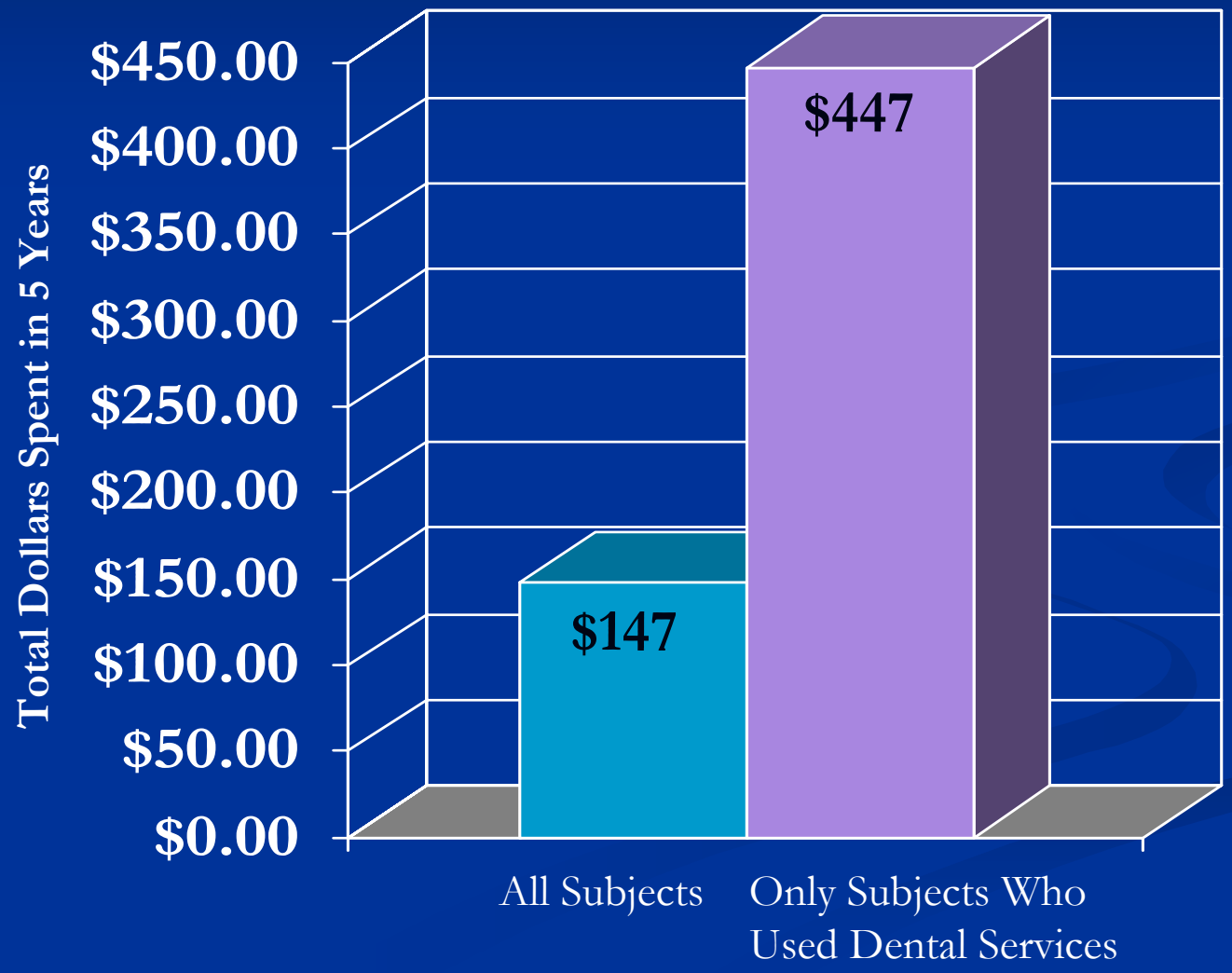
Effect of Preventive Visit by Age 3 on Subsequent Dental Utilization

	Effect	*P*-value
Subsequent Preventive Visit	+	0.00
Subsequent Restorative Visit	+	0.00
Subsequent Emergency Visit	+	0.00

Effects of Age of the First Preventive Dental Visit on Subsequent Use of Dental Services

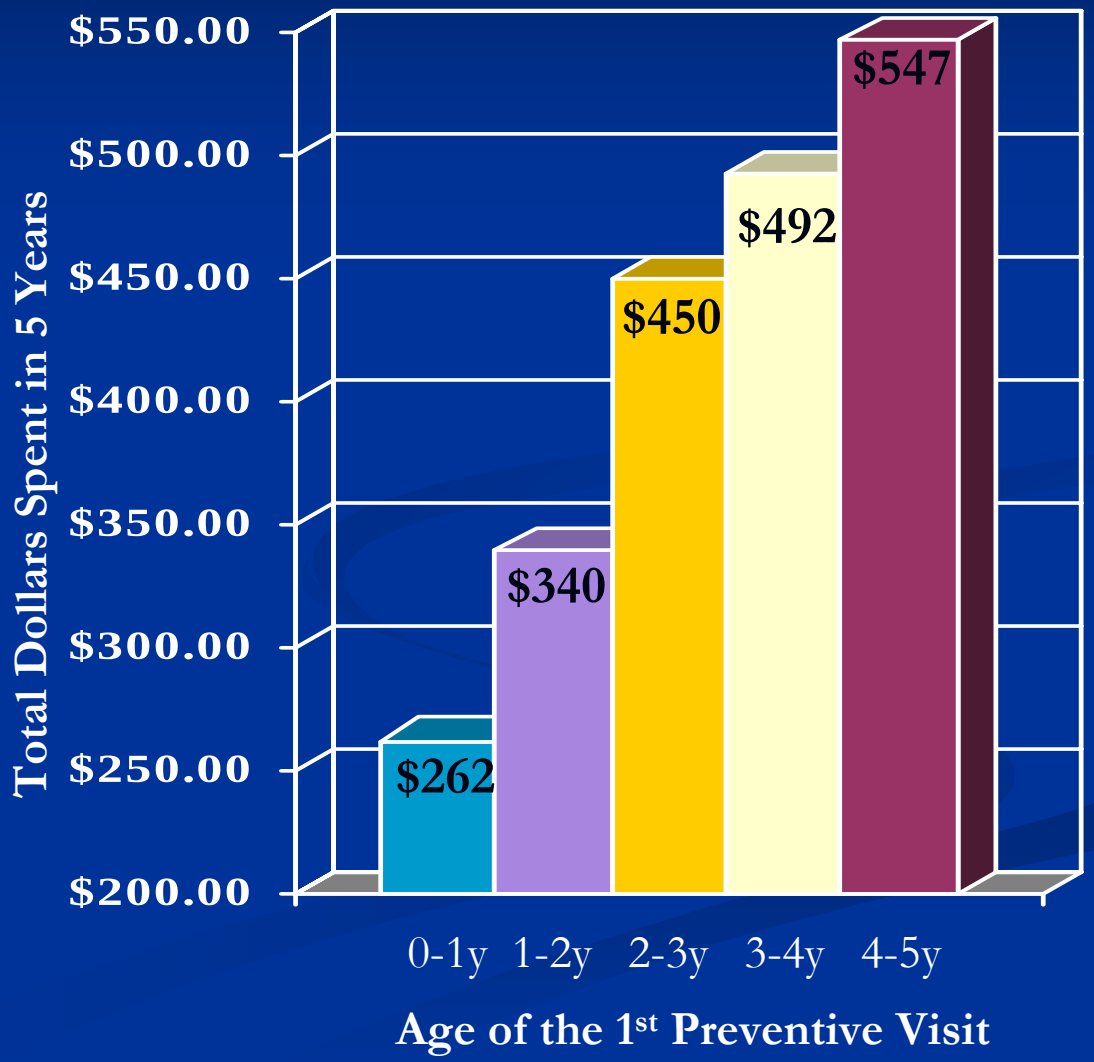
- Being nonwhite and the number of dentists/10,000 were the only two variables that were consistently significant for each of the types of visits and all age groups.
- Being nonwhite had a statistically significant negative effect on subsequent dental utilization, no matter whether it was a preventive visit, restorative visit, or emergency visit.
- Dentists/10,000 had a statistically significant positive effect on subsequent dental utilization among all age groups and types of dental visits.

Dental Expenditures



Effects of Age of the First Preventive Dental Visit on Dentally-Related Costs

- Having had a preventive visit by age 1, 2, 3, 4, and 5 all had a significant effect on costs (*P*-value =0.00).
- There was a trend for a reduction in total cost when high-risk children had the first preventive visit by age 1.



Effects of Age of the First Preventive Dental Visit on Dentally-Related Costs

- Being nonwhite had a statistically significant negative effect on subsequent costs in all age groups.
- Dentists/10,000 had a statistically significant positive effect on subsequent costs in all age groups.
- The age of the mother had a statistically significant positive effect of subsequent cost in all age groups.

Discussion

- In our sample population of high risk children, only a very small percentage had their first preventive visit by age 1.
- Being nonwhite consistently had a significant negative effect on having an early preventive visit and having any type of subsequent dental utilization.
- The average number of dentists/10,000 consistently had a positive effect on having a early preventive visit and having any type of subsequent dental utilization.

Discussion

- Having a had preventive visit by age 1 significantly increased the likelihood of having preventive visits in the future without significantly increasing likelihood of having future restorative or emergency visits.
- Delaying the time of the first preventive visit after age 1 significantly increased the likelihood of subsequent restorative and emergency visits.

Discussion

What factors might have been operating to explain why children who started dental care by age one followed a pattern of less invasive care than those who started dental care later? There are several explanations to be considered

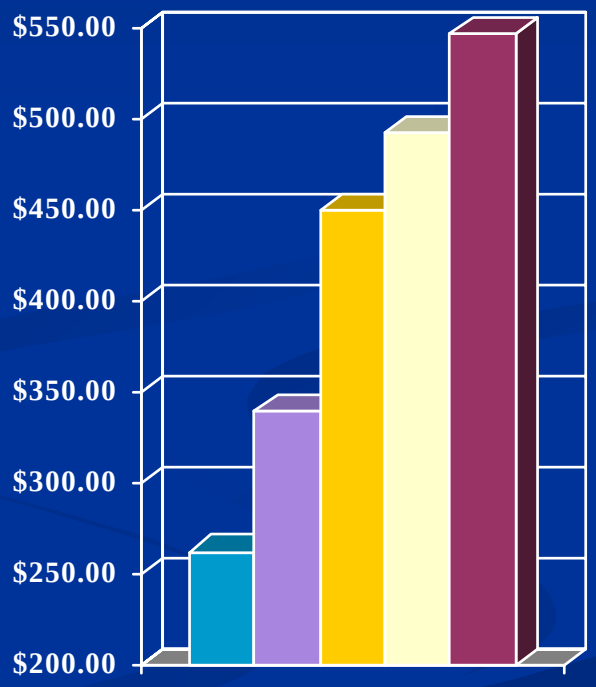
Discussion

- The first is selection bias. It is possible that those children who were seen by age one were the children of parents who were the most motivated to provide the best possible oral health care for their children. This parental behavior would be expected to carry over into home care, diet, and nutrition—all factors that would lead to improved oral health.

- A second rationale to explain why those children who started preventive care earlier fared better might be related to a positive outcome from the oral anticipatory guidance given to the parents who took their children to an early preventive visit.

Discussion

- A early preventive visit by age 1 shows a trend towards decreasing total cost over the five year study compared to a later preventive visit or no preventive visit at all.
- The average cost per child during the 5 year study for a first preventive visit by age 1 was $262 compared to $547 between ages 4 and 5.



Discussion

- 348 children were treated in the operating room before age five.
- 70% of these children had not had a previous preventive visit.
- This suggests that having an early preventive visit could have prevented many of these operating room visits.

Limitations

- As discussed previously, there was a potential for selection bias.

- A second shortcoming of our study was that we could not determine caries level for each individual child because we relied upon dental claims data for our outcome measures. However, based on previous research in low income children, we would anticipate that this population would be at high risk for dental disease and would benefit from an early preventive dental visit. Knowledge of disease rate would have allowed us to determine how early preventive services affected subsequent caries rates.

Limitations

- A third limitation is that we limited our sample to children continuously enrolled in the NC Medicaid program from birth to their fifth birthday, substantially reducing our sample population. However, this did allow us to control for children who had gaps in their Medicaid coverage and might have had dental visits outside the Medicaid program.

Conclusions

- Preschool children were more likely to receive dental services of all types in those counties with higher dentists per population ratios.
- Preschool children from racial minority groups had greater difficulty in finding access to dental care.

Conclusions

- Preschool children who had an early preventive dental visit were more likely to use preventive services in the future.

- Preschool children who utilized early preventive dental care incurred fewer dentally-related costs compared to those who began this care at a later time.

Reasons Why North Carolina and Wisconsin results might Differ?

- Selection criteria used.
- Definition of preventive dental visit.
- Definition of dentally related costs: anesthesia, hospital and emergency room costs.
- Differences in access to care and health disparities.

North Carolina:

- ranks 47th in the number of all dentists
- ranks 45th in the number of pediatric dentists
- ranks 44th in dentists' participation in Medicaid
- ranks 1st in percent growth in its Hispanic population between 1990 and 2000
- has a child born into poverty every 23 minutes
- ranks 10th in number of children

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