Supplemental Information

Prediction Model Supplement

Prediction Models at the 1st AOM

For the children who attended daycare, we fitted a Poisson GLM model with the natural logarithm as the link function. The estimated functional relationship can be written as

$$\log(Mean\ \ TotalAOMs) = 0.218 + 6.48/\text{AgeAOM1}$$

or

$$Mean\ \ TotalAOMs = \exp\left(0.218 + \frac{6.48}{\text{AgeAOM1}}\right) = 1.24 \cdot 10^{2.814/\text{AgeAOM1}}$$

and is shown in Figure 4A and Supplemental Fig 8 as a solid line.

Prediction Models at the 2nd AOM

In this section, we again explore a Poisson GLM model with the natural logarithm as the link function. The model predicts the expected total number of AOMs (Mean Total AOMs) as a function of the child's age at the second AOM (Age AOM2), which turns out to be significant at $p < .001$. In this case, there were no other significant predictors based on the child demographics and risk factors, including daycare. The estimated functional relationship can be written as

$$\log(Mean\ \ TotalAOMs) = 0.693 + 5.38/\text{AgeAOM2}$$

or

$$Mean\ \ TotalAOMs = \exp\left(0.693 + \frac{5.38}{\text{AgeAOM2}}\right) = 2.00 \cdot 10^{2.337/\text{AgeAOM2}}$$

and is shown in Figure 4B and Supplemental Fig 10 as a solid line.

Prediction Models at the 3rd AOM

We have also made predictions based on the child's age at the third AOM (Age AOM3) ($p < .001$). The estimated functional relationship can be written as

$$\log(Mean\ \ TotalAOMs) = 1.056 + 4.64/\text{AgeAOM3}$$

or

$$Mean\ \ TotalAOMs = \exp\left(1.056 + \frac{4.64}{\text{AgeAOM3}}\right) = 2.87 \cdot 10^{2.015/\text{AgeAOM3}}$$

This model is shown in Figure 4D and Supplemental Fig 11. The dots in Figure 4D represent the averages in a 1/ 1-month window around the age specified on the horizontal axis.

Prediction Models at the 4th AOM

Finally, we have made predictions based on the child's age at the fourth AOM (Age AOM4) ($p = .037$). The estimated functional relationship can be written as

$$\log(Mean\ \ TotalAOMs) = 1.318 + 3.94/\text{AgeAOM4}$$

or

$$Mean\ \ TotalAOMs = \exp\left(1.318 + \frac{3.94}{\text{AgeAOM4}}\right) = 3.74 \cdot 10^{1.711/\text{AgeAOM4}}$$

This model is shown in Figure 4F and Supplemental Fig 12. The dots in Figure 4F represent the averages in a 1/ 1-month window around the age specified on the horizontal axis.

Pressure Equalizing Tubes (PETs)

The solid line is the line of equality between the 2 coordinates. The horizontal and vertical dashed lines mark the 6-month threshold.

Supplemental Fig 13 shows a scatterplot of the gap between the last AOM before PET to the first 1 after PET plotted versus the time from PET to the following AOM for 15 children, who had AOM after PET. The solid line is the line of equality between the 2 coordinates. The points must always be above the solid line, since the vertical axis measures the time from an earlier event (AOM before PET) versus the horizontal axis, which measures the time from PET. The points close to the solid line indicate PETs were performed soon after an AOM that precipitated the decision to have the surgery performed. The horizontal and vertical dashed lines mark the 6-month threshold.

SUPPLEMENTAL TABLE 3 The Number of Children With AOMs in the Given Age Intervals

Age Range, Mo	Up to 6	6–9	9–12	12–15	15–18	18–21	21–24	24–27	Above 27
Number of children with AOM[a]	23	109	113	103	55	46	31	27	33

[a] The same child can have AOMs at various ages, and consequently can be counted multiple times in this table.

SUPPLEMENTAL TABLE 4 Demographic Data of Children Who Had Multiple Episodes of WOS in Figure 2

Subject #	Age of WOS1	Age of WOS2	Child Care Type	Child Care Changes Occurred Between WOS1 and WOS2	Siblings	Breastfed at 6 Mo
1	3.4–8.6	20.2–21.3	Center	*Class size change at 18 mo*	<5 y	No
2	4.0–8.8	15.4–20.9	Center	*Class size change at 18 mo*	<5 y	No
3	4.9–6.2	24.2–33.0	NA		<5 y and >5 y	No
4	6.2–6.7	21.6–25.3	Center	*Class size change at 18 mo*	<5 y	No
5	6.2–8.7	19.9–23.0	Center	*Class size change at 18 mo*	<5 y	No
6	8.3–12.1	24.0–24.7	Center	4 to 10 children	No siblings	No
7	9.3–13.7	21.4–23.8	Center	Daycare at 9 mo, no daycare at 15 mo, start daycare by 18 mo	No siblings	Yes
8	9.6–13.4	21.4–23.8	Home type	Daycare at 9 mo, no daycare at 18 mo, start home type daycare by 2 y	No siblings	Mixed
9	14.4–15.0	22.3–22.9	Center	*Class size change at 18 mo*	<5 y	No

Age of windows of susceptibility (WOS) of AOM is shown for WOS #1 and WOS #2. Child care type: center: provides care for more than 6 children, not in a personal residence. Home type: provides care for up to 6 children in a residence. NA: no child care attendance. Child care changes are data informed by the child's parent or guardian. Italic child care changes are New York State regulation for licensed child care.

SUPPLEMENTAL TABLE 5 The Number of Children Attending Daycare Who Had Their AOM 1 in the Given Age Intervals

Age Range, Mo	Up to 6	6–9	9–12	12–15	15–18	18–21	21–24	24–27	Above 27
Number of children with AOM 1	14	55	38	21	11	6	5	5	1

Supplemental Table 5 shows the number of children attending daycare who had their AOM 1 in the given age intervals. As many as 14 children under 6 mo of age provide a solid support for our modeling, even at this far left side of the age range.

SUPPLEMENTAL TABLE 6 The Number of Children Not Attending Daycare Who Had Their AOM 1 in the Given Age Intervals

Age Range, Mo	Up to 6	6–9	9–12	12–15	15–18	18–21	21–24	24–27	Above 27
Number of children with AOM 1	6	30	22	21	10	7	4	2	5

Supplemental Table 6 shows the number of children not attending daycare who had their AOM 1 in the given age intervals. When comparing to Supplemental Table 5, we notice fewer children with early AOM 1 and more children with AOM 1 at later age. As many as 5 children had their AOM 1 after 27 mo comparing to 1 child at that age for children attending daycare. Consequently, we investigated how the age at AOM 1 might depend on demography and risk factors. Childcare turns out to be the only significant factor ($P = .016$). The model shows that children attending childcare have their first AOM 1.66 mo earlier, on average, then the remaining children.

SUPPLEMENTAL TABLE 7 The Number of Children Who Had Their AOM 2 in the Given Age Intervals

Age Range, Mo	Up to 6	6–9	9–12	12–15	15–18	18–21	21–24	24–27	Above 27
Number of children with AOM 1	5	40	41	37	13	16	4	7	9

SUPPLEMENTAL TABLE 8 The Number of Children Who Had Their AOM 3 in the Given Age Intervals

Age Range, Mo	Up to 6	6–9	9–12	12–15	15–18	18–21	21–24	24–27	Above 27
Number of children with AOM 1	2	16	19	21	15	9	12	4	9

The model fit in Supplemental Fig 11 is not as good as in the previous models. This could be caused by further reduction in the sample size (Supplemental Table 8), since fewer children had as many as three AOMs. Nevertheless, the model still seems to be a reasonable approximation, on average, over the whole range of AgeAOM3 values.
We can see that for children who experienced their third AOM before the age of 9 mo, we can expect as many as 5 total number of AOMs on average.

SUPPLEMENTAL TABLE 9 The Number of Children Who Had Their AOM 4 in the Given Age Intervals

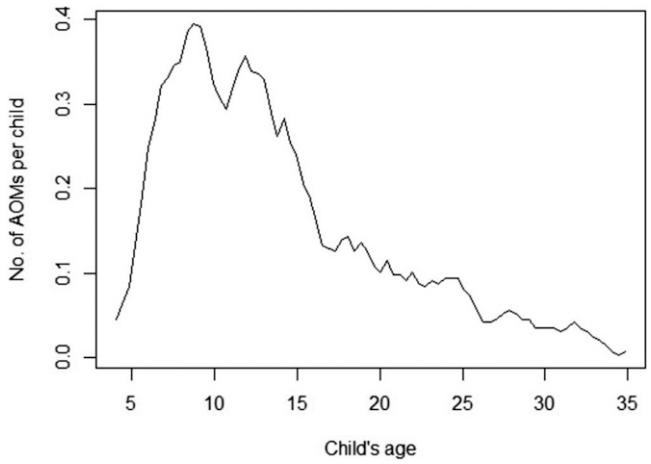
Age Range, Mo	Up to 6	6–9	9–12	12–15	15–18	18–21	21–24	24–27	Above 27
Number of children with AOM 1	0	5	15	16	6	8	2	6	7

The model fit is somewhat better than the one in Figure 4D and Supplemental Fig 12. We can see in Supplemental Table 9 that there are only 5 observations with age AOM4 under 9 mo. However, there are 15 observations in the next interval 9 to 12 mo, which provides the support for the downward trend shown in Supplemental Fig 13. The statistical significance of this functional relationship is only $P = .037$, which provides only a moderate support for the model. We can see that for children who experienced their fourth AOM before the age of 9 mo, we can expect as many as 5.5 to 6 total number of AOMs on average. For those with age AOM4 in the range between 9 and 12, we can expect as many as 5 to 5.5 total number of AOMs on average.

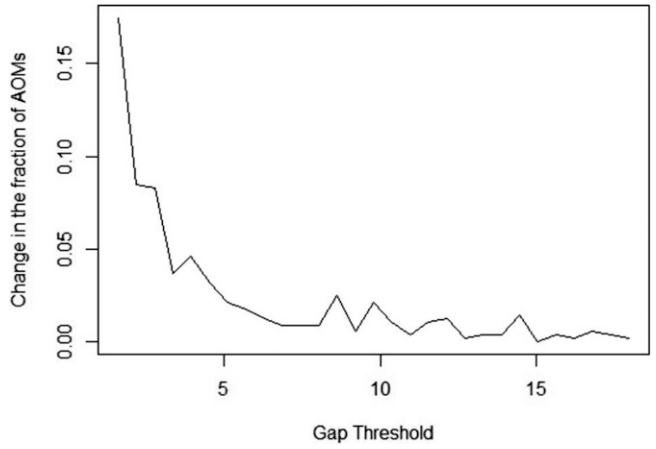
SUPPLEMENTAL TABLE 10 AOM Prediction Models

	Child Age, Mo	Predicted Number of Additional AOMs	Formula to Calculate Predicted Number of Additional AOMs in Column C
Age in months at AOM 1 (no daycare)	6	1.1	IF(B8<19,2.1,1.1)-1
Age in months at AOM 1 (daycare)	7	2.1	EXP(0.218 + 6.48/B9)-1
Age in months at AOM 2	8	1.9	EXP(0.693 + 5.38/B10)-2
Age in months at AOM 3	10	1.6	EXP(1.056 + 4.64/B11)-3
Age in months at AOM 4	12	1.2	EXP(1.318 + 3.94/B12)-4

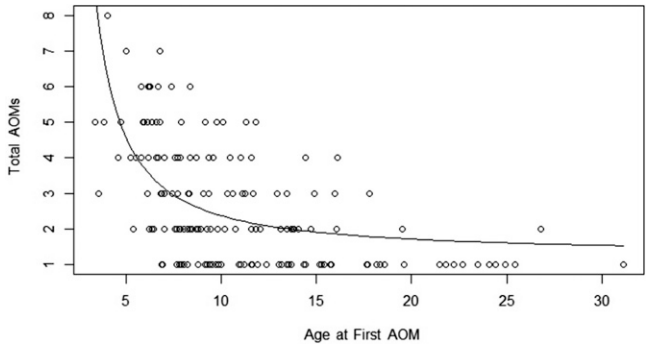
To calculate the prediction for future AOMs, insert the child age in months in column B. To calculate the prediction for future AOMs, insert the child age in months in column B. The value in column B will be replaced by the child age for a specific patient.



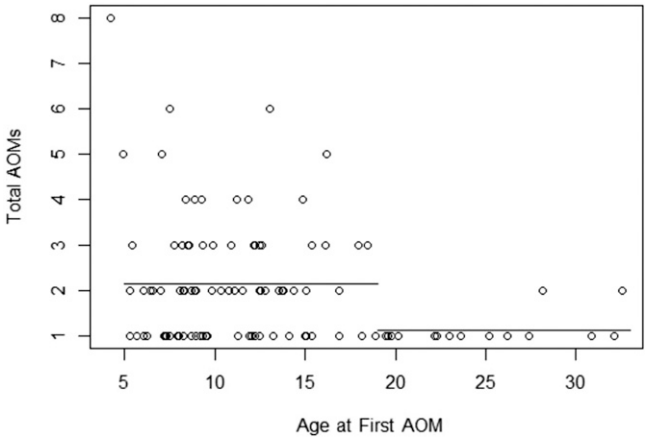
SUPPLEMENTAL FIGURE 6
The number of AOMs per child per 2-month period with the middle point of a given 2-month period plotted on the horizontal axis.



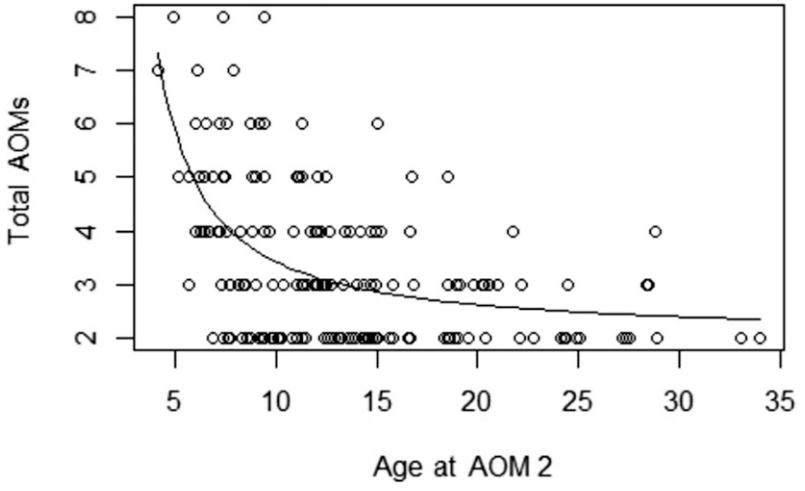
SUPPLEMENTAL FIGURE 7
The rate of change in the fraction of AOMs as shown in Figure 3 versus the gap between AOMs on the horizontal axis. This illustrates that the rate of change is high up until the 6-month gap threshold, and after that, the rate becomes fairly constant.



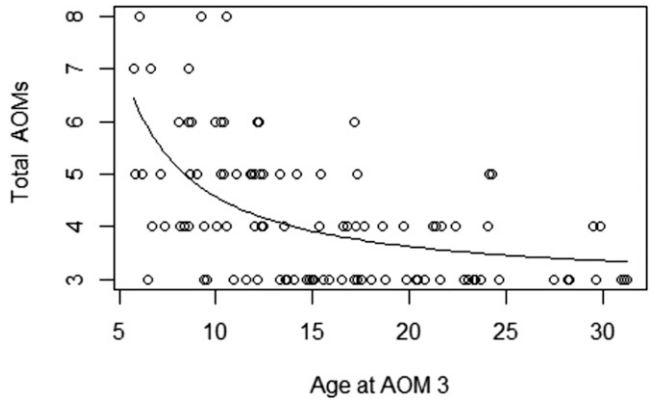
SUPPLEMENTAL FIGURE 8
The model for predicting total AOMs as a function of age AOM1 for children who attended daycare. The dots represent individual observations.



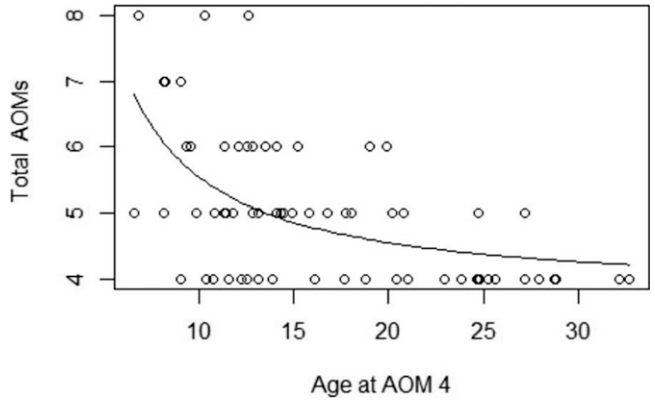
SUPPLEMENTAL FIGURE 9
The model for predicting total AOMs as a function of age AOM1 for children who did not attend daycare. The dots represent individual observations.



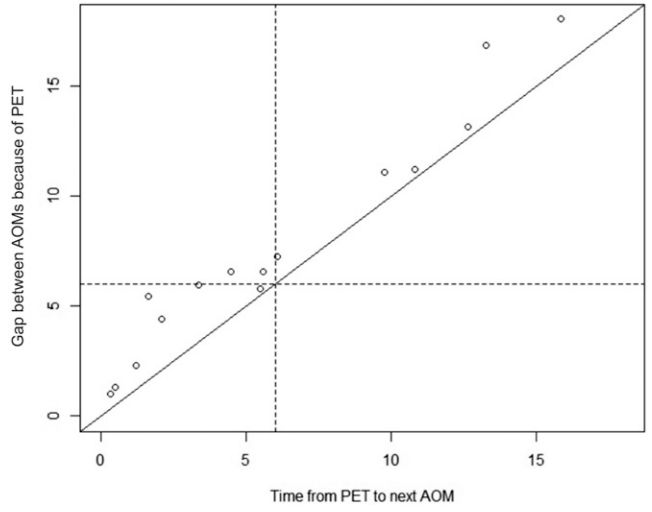
SUPPLEMENTAL FIGURE 10
The model for predicting total AOMs as a function of age AOM2. The dots represent individual observations.



SUPPLEMENTAL FIGURE 11
The model for predicting total AOMs as a function of age AOM3. The dots represent individual observations.



SUPPLEMENTAL FIGURE 12
The model for predicting total AOMs as a function of age AOM4. The dots represent individual observations.



SUPPLEMENTAL FIGURE 13
A scatterplot of the gap between the last AOM before PET to the first 1 after PET plotted versus the time from PET to the following AOM for 15 children, who had AOM after PET.