Cost-effectiveness Analysis of Palivizumab in Premature Infants Without Chronic Lung Disease

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Objectives: To evaluate the cost-effectiveness of palivizumab as respiratory syncytial virus prophylaxis in premature infants without chronic lung disease and to evaluate the impact on cost-effectiveness of a potential reduction in risk of asthma following respiratory syncytial virus infection among infants receiving palivizumab.

Design: Two decision analytic models were designed, one with and the other without accounting for increased risk of asthma following respiratory syncytial virus infection.

Setting: A hypothetical community or university hospital.

Participants: Hypothetical cohorts of infants without chronic lung disease born at 26 to 32 weeks’ gestation.

Interventions: Palivizumab prophylaxis vs no prophylaxis.

Main Outcome Measures: Expected costs and incremental cost-effectiveness ratio expressed as cost per quality-adjusted life-year.

Results: The expected costs were higher for palivizumab prophylaxis as compared with no prophylaxis. The incremental cost-effectiveness ratios were high for all gestations and are not considered cost-effective by today’s standards (<$200 000 per quality-adjusted life-year). Both models were sensitive to variation in the cost of palivizumab. The model that included asthma was sensitive to variation in quality of life for children with asthma. In instances where asthma was considered severe with profound worsening in quality of life compared with life without asthma, some infants had an incremental cost per quality-adjusted life-year that was less than $200 000.

Conclusions: Our model supports implementing more restrictive guidelines for palivizumab prophylaxis. Palivizumab was cost-effective for some infants in an analysis that accounted for increased risk of severe asthma following respiratory syncytial virus infection.

Arch Pediatr Adolesc Med. 2006;160:1070-1076

In part owing to cost concerns, the AAP policy recommended the use of palivizumab only in infants at highest risk for severe RSV infection. A number of economic analyses of RSV intravenous immunoglobulin and palivizumab have been performed in the United States and in other countries. Multiple economic analyses of palivizumab performed outside of the United States concluded that the use of the prophylaxis is not cost-effective, but analyses performed in the United States have generated mixed results. A systematic review of economic analyses of RSV intravenous immunoglobulin and palivizumab found a significant difference in results by funding source (P = .002); all of the 4 studies with pharmaceutical funding reported that
the prophylaxis was either cost-effective or cost-saving for a high-risk infant population whereas none of the 8 studies without pharmaceutical funding reported similar findings.23 None of these analyses considered potential long-term sequelae, i.e., the possible increased risk of asthma following RSV infection in infancy and its impact on quality of life.21

The objectives of this study were to evaluate the cost-effectiveness of palivizumab as RSV prophylaxis in premature infants without chronic lung disease and to evaluate the impact on cost-effectiveness of a potential reduction in risk of asthma following RSV infection among infants receiving palivizumab. To our knowledge, our model is the first to study the cost-effectiveness of RSV prophylaxis by specific gestational age, to evaluate the implication of the possible increased risk of asthma with RSV infection, and to integrate measures of morbidity (quality-adjusted life-years).

METHODS

MODEL SETTING AND ASSUMPTIONS

This study was an economic evaluation using decision analytic modeling. The DATA 3.5 for Healthcare software package (TreeAge Software, Williamstown, Mass) was used to combine data from secondary data sources, including publications and government documents, and to simulate costs and outcomes for the intervention.

A hypothetical cohort of premature infants born at 26 to 32 weeks’ gestation was assumed to be discharged from the neonatal intensive care unit at 36 weeks’ postconceptional age based on unpublished data from the University of Rochester Medical Center, Rochester, NY (T.P.S., 2003). We assumed that an infant had an equal probability of being discharged from the neonatal intensive care unit at different months of the year. Each infant’s weight at the time of discharge was assumed to be 2000 g (10% of the growth curve for an infant at 36 weeks’ postconceptional age).22 Because the association between RSV infection and asthma remains unclear, we completed 2 sets of analyses, one with and the other without asthma included in the models. The models including asthma used time-dependent Markov processes to allow the impact of asthma to vary with the age of the cohort.22 Analyses were conducted from the societal perspective around the risk of asthma to vary with the age of the cohort.22 Analyses were conducted from the societal perspective.

The model was constructed for each gestational age. Sensitivity analyses were performed to test the robustness of the results. Sensitivity analyses were performed to test the robustness of the results. The model combined published data on the risk of RSV hospitalization by gestational age, the seasonal pattern of RSV hospitalization, the efficacy of palivizumab in reducing the risk of RSV hospitalization, national costs of RSV hospitalizations, costs of palivizumab injection visits, costs of emergency department visits, drug costs, and costs of work hours missed by parents for visits and hospitalization. In the base-case analysis with asthma, the model also included the risk of asthma, reduction in quality of life due to asthma, and national estimates of the cost of asthma for a child with the disease. There is no current evidence that palivizumab reduces the probability of death in infants; therefore, we did not include risk of death secondary to RSV hospitalization in the models.26,27 Analyses without asthma had a time horizon of 1 year in the base-case analysis, whereas 10 years in sensitivity analyses to reflect the length of increased risk of asthma following RSV bronchiolitis.22-24 Future benefits and costs were discounted at 3% annually. The use of RSV prophylaxis was evaluated using the incremental cost-effectiveness ratio (ICER), defined as the additional costs associated with the use of palivizumab divided by the additional quality-adjusted life-years associated with its use. Based on recent recommendations,26 we considered an ICER of less than $ 200,000 per quality-adjusted life-year to be cost-effective.

NONCOST PARAMETERS

The values of noncost parameters included in the model are shown in Table 1. The table shows base-case values and ranges of values used for sensitivity analyses.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average probability of RSV hospitalization in the prophylaxis group*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26-wk gestation</td>
<td>0.052</td>
<td>NA</td>
</tr>
<tr>
<td>27- to 28-wk gestation</td>
<td>0.037</td>
<td>NA</td>
</tr>
<tr>
<td>29- to 30-wk gestation</td>
<td>0.028</td>
<td>NA</td>
</tr>
<tr>
<td>31-wk gestation</td>
<td>0.016</td>
<td>NA</td>
</tr>
<tr>
<td>32-wk gestation</td>
<td>0.011</td>
<td>NA</td>
</tr>
<tr>
<td>Probability of asthma in control group, %26,27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 1 y</td>
<td>0.0</td>
<td>0.0-6.2</td>
</tr>
<tr>
<td>Age 3 y</td>
<td>1.0</td>
<td>1.0-6.2</td>
</tr>
<tr>
<td>Age 7.5 y</td>
<td>3.0</td>
<td>3.0-6.2</td>
</tr>
<tr>
<td>Probability of asthma in RSV group, %26,27,28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 1 y</td>
<td>11</td>
<td>11-45</td>
</tr>
<tr>
<td>Age 3 y</td>
<td>23</td>
<td>23-45</td>
</tr>
<tr>
<td>Age 7.5 y</td>
<td>30</td>
<td>30-45</td>
</tr>
<tr>
<td>Duration of increased risk of asthma following RSV infection during infancy, y26-27,28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.5</td>
<td>7.5-10.0</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: NA, not applicable; RSV, respiratory syncytial virus.

*Average probability of RSV hospitalization in the prophylaxis group = average probability of RSV hospitalization in the no-prophylaxis group × (1 – efficacy).

We calculated the probability of RSV hospitalization by specific gestational age and month of neonatal intensive care unit discharge29,30 by using gestational age–specific RSV hospitalization rates and the seasonal pattern of respiratory hospitalization. We used gestational age–specific risks (ie, at ≤ 26, 27-28, 29-30, and 31-32 weeks’ gestation) of RSV hospitalization and asthma.
tion among infants without chronic lung disease using data from
efficacy of palivizumab in reducing risk of RSV hospitaliza-
fants in sensitivity analyses.

/H11003
visit = cost of 1 hour of work lost by parents
RSV bronchiolitis reported in retrospective studies.38-46
ered the range of values of increased risk of asthma following
Sigurs and colleagues. In the sensitivity analysis, we consid-
considered gestational age–specific risks. We applied a monthly ad-
adjustment factor based on the seasonal relationship between hos-
tailored gestational age–specific risks. We applied a monthly ad-
with RSV bronchiolitis as infants relative to controls (data shown
in Table 1). A linear extrapolation was performed to calculate
the risk of asthma at ages not included in these articles by

as reported by Stevens et al10 in the only study to provide de-
tailed gestational age–specific risks. We applied a monthly ad-
 convince to 95% to determine whether prophylaxis would

Length of RSV Hospitalization
From reported values, an average length of stay of 6.8 days30,34,36,37
for RSV hospitalization was included in our base-case anal-
ysis. The entire range of values reported in the literature was con-
sidered in sensitivity analyses.

Probability of Asthma and Length of Increased Risk
of Asthma following RSV Bronchiolitis
We based our estimates of the increased risk of asthma on data
by Sigurs et al26,27 in the only study to prospectively evaluate the
risk of asthma among children who had been hospitalized
with RSV bronchiolitis as infants relative to controls (data shown
in Table 1). A linear extrapolation was performed to calculate
the risk of asthma at ages not included in these articles by
Sigurs and colleagues. In the sensitivity analysis, we consid-
ered the range of values of increased risk of asthma following
RSV bronchiolitis reported in retrospective studies.30-46

Quality of Life
With and Without Asthma
Quality of life data have been increasingly used to evaluate the
benefits of health care options. In this approach, patients’ pref-
ences for a condition are multiplied by the duration spent with
the condition to generate a quality-adjusted life-year. Quality-
of-life estimates for children with symptomatic asthma (0.89)47
and the absolute difference in quality of life with and without
asthma (0.03)48 were obtained from articles and measured us-
ing the Health Utility Index. In sensitivity analyses, the qual-
ity of life with asthma was varied by 1 SD.47

MODEL COSTS
The costs included in the model are shown in Table 2. Costs
are reported in 2002 US dollars and estimates were updated
with relevant portions of the Consumer Price Index31,32,34 as
ecessary.

Drug Costs
The current recommended palivizumab dosage is 15-mg/kg
intramuscular injections once per month for a total of 5 doses
during the RSV season, which is November through March.
The costs of 50-mg and 100-mg vials of palivizumab were
derived from published wholesale prices.49 Once reconsti-
tuted, the shelf life of palivizumab is estimated at 6 hours,21
hence, drug wastage was accounted for in the base-case
analysis.

We predicted the weight that a 2000-g infant would attain
at each recommended palivizumab injection visit using stan-
dard growth curves22 to calculate the total amount and the cost
of the drug. Assumptions about drug wastage and costs were
varied in sensitivity analyses.

Costs of Drug Injection
Palivizumab injections were assumed to take place during of-

Hospitalization Costs
Stang et al46 estimated the cost of an infant hospitalized with
RSV infection using a National Inpatient Sample. The 95% confi-
dence interval ($8000-$10 520) of the estimate was used in
our sensitivity analyses.

Emergency Department
Visit Costs
We assumed that infants hospitalized with RSV infection were
admitted through the emergency department with a visit coded
as being of moderate severity. The cost of an emergency depart-
ment visit of moderate severity was obtained from local esti-
mates in Rochester, NY. Medicare reimbursement rates were not
used owing to this being a pediatric population.

Nonmedical Costs
We assumed that 1 parent lost an average of 8 hours of work
per day during RSV hospitalization as well an average of 3
hours of work per day for palivizumab injection visits and
department visits. The national costs of time lost
from work were based on US Bureau of Labor Statistics
data.31

Table 2. Point Estimates of Cost Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate, US $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of palivizumab49</td>
<td></td>
</tr>
<tr>
<td>50-mg vial</td>
<td>725.00</td>
</tr>
<tr>
<td>100-mg vial</td>
<td>1370.00</td>
</tr>
<tr>
<td>Cost of visit for palivizumab injection50</td>
<td>70.00</td>
</tr>
<tr>
<td>Cost of RSV hospitalization30,31,35</td>
<td>9260.00</td>
</tr>
<tr>
<td>Cost of emergency department visit by local estimates</td>
<td>405.00</td>
</tr>
<tr>
<td>Cost of 1 h of work lost by parents53</td>
<td>16.63</td>
</tr>
<tr>
<td>Cost of work time lost by 1 parent during RSV hospitalization54,55</td>
<td>38.50</td>
</tr>
<tr>
<td>Cost of work time lost by parents during RSV hospitalization54,55</td>
<td>907.00</td>
</tr>
<tr>
<td>Cost of work time lost by parents during emergency department visit54,55</td>
<td>49.90</td>
</tr>
<tr>
<td>Costs of asthma52,54,55</td>
<td>859.00</td>
</tr>
</tbody>
</table>

Abbreviation: RSV, respiratory syncytial virus.
*Cost of work time lost by 1 parent during RSV hospitalization = length of hospitalization \( \times 8 \times \) cost of 1 hour of work lost by parents.
†Cost of work time lost by parents during emergency department visit = cost of 1 hour of work lost by parents \( \times 3 \).
Costs of Asthma

Estimates of per capita costs of asthma for persons younger than 18 years were taken from the study by Weiss et al.55 These estimates included the costs of inpatient and outpatient hospital services, emergency department visits, office-based physician services, and pharmaceuticals as well as time lost from work.

TARGETED USE POLICY

In addition to the 2 scenarios and 1-way sensitivity analyses described earlier, we generated estimates for a targeted best-case scenario for the use of palivizumab prophylaxis. The current AAP recommendations for the use of palivizumab result in treating many infants who are at low risk for RSV hospitalization, leading us to conduct additional simulations modifying the current recommendations to seek more cost-effective alternatives using the following parameters: no drug wastage; application of prophylaxis restricted to only the infant's first RSV season; younger chronological age cutoffs, ie, infants assumed to be discharged from September through March; and infants born at 27 weeks' gestation or earlier if discharged before the RSV season and infants born at 30 weeks' gestation or earlier if discharged during the RSV season.

RESULTS

COST-BENEFIT ANALYSIS ASSUMING NO CAUSAL RELATIONSHIP WITH ASTHMA

The results for the different gestational ages are summarized in Table 3. The results for infants born at 29 and 30 weeks' gestation are reported together since the estimates of the cost and probabilities are identical for infants born at these gestational ages.

Irrespective of the gestational age at birth, we found that the added costs of prophylaxis are greater than the savings from reduced hospitalizations. The expected costs for the prophylaxis group are greatest for infants born at 28 weeks' gestation ($8000 in the model with no increased risk of asthma). Thereafter, the expected costs decrease markedly.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Expected costs, US $</th>
<th>Incremental*</th>
<th>26</th>
<th>27</th>
<th>28</th>
<th>29-30</th>
<th>31</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected costs, US $</td>
<td>No prophylaxis</td>
<td>2184</td>
<td>1548</td>
<td>1548</td>
<td>1198</td>
<td>678</td>
<td>678</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Palivizumab prophylaxis</td>
<td>7298</td>
<td>7137</td>
<td>8000</td>
<td>3725</td>
<td>3530</td>
<td>4092</td>
<td></td>
</tr>
<tr>
<td>Incremental*</td>
<td></td>
<td>5114</td>
<td>5589</td>
<td>6452</td>
<td>2527</td>
<td>2852</td>
<td>3414</td>
<td></td>
</tr>
</tbody>
</table>

COST-EFFECTIVENESS ANALYSIS ASSUMING A CAUSAL RELATIONSHIP WITH ASTHMA

The ICERs for the different gestational ages are summarized in Table 3. The ICERs are higher than $200 000 per quality-adjusted life-year for all gestations and reach a maximum of $1 855 000 per quality-adjusted life-year for infants born at 32 weeks' gestation when palivizumab is used in accordance with AAP recommendations.

SENSITIVITY ANALYSES

The results of the most significant sensitivity analyses are summarized in Table 4 for the models without increased risk of asthma and in Table 5 for the models with increased risk of asthma. These analyses were shown for 5 different gestational ages to display the trend of varying a specific quantity in the model on ICERs and incremental expected costs. In the model without asthma, the use of RSV prophylaxis did not result in cost savings for any of the sensitivity analyses performed. The model that included asthma was sensitive to varying the quality of life for children with asthma and costs of palivizumab vials. When the quality of life with asthma was reduced to 0.8, the ICER was approximately $200 000 per quality-adjusted life-year for infants born at 26 and 29 to 30 weeks' gestation (Table 5). Reductions in palivizumab costs to 25% of their current values result in an ICER less than $100 000 per quality-adjusted life-year for infants born at 26 and 29 weeks' gestation.

TARGETED USE POLICY

The alterations included in the targeted policy dramatically improved the ICER for the use of palivizumab, with the ICER ranging from $103 053 per quality-adjusted life-year for infants born at 26 weeks' gestation to $280 083 per quality-adjusted life-year for infants born at 29 and 30 weeks' gestation. With the targeted policy, the ICER

<table>
<thead>
<tr>
<th>Variable</th>
<th>Expected costs, US $</th>
<th>Change in QALY</th>
<th>26</th>
<th>27</th>
<th>28</th>
<th>29-30</th>
<th>31</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected costs, US $</td>
<td>No prophylaxis</td>
<td>2493</td>
<td>1790</td>
<td>1790</td>
<td>1403</td>
<td>925</td>
<td>829</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Palivizumab prophylaxis</td>
<td>7435</td>
<td>7257</td>
<td>8120</td>
<td>3852</td>
<td>3711</td>
<td>4185</td>
<td></td>
</tr>
<tr>
<td>Change in QALY</td>
<td></td>
<td>0.0060</td>
<td>0.0042</td>
<td>0.0042</td>
<td>0.0036</td>
<td>0.0023</td>
<td>0.0018</td>
<td></td>
</tr>
<tr>
<td>ICER†</td>
<td></td>
<td>830 152</td>
<td>1 295 781</td>
<td>1 500 351</td>
<td>675 780</td>
<td>1 212 497</td>
<td>1 855 000</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: ICER, incremental cost-effectiveness ratio; QALY, quality-adjusted life-year.

*Incremental expected costs = expected costs for prophylaxis group − expected costs for no-prophylaxis group.
†Incremental cost-effectiveness ratio = (cost of palivizumab prophylaxis − cost of no prophylaxis)/(QALY for palivizumab prophylaxis − QALY for no prophylaxis).
is less than $200 000 per quality-adjusted life-year for infants born at 26 or 27 weeks’ gestation.

This decision analytic model compared the costs and effects of palivizumab prophylaxis for RSV and no prophylaxis for a hypothetical cohort of premature infants without chronic lung disease. Our results show that palivizumab prophylaxis is not cost-effective for these infants. Under the first scenario in which we assumed that RSV had no effect on asthma rates, we found that for all gestational ages, the increased costs associated with the use of prophylaxis were greater than the cost savings from reduced hospitalizations and other costs. The decrease in expected costs for infants born at more than 26 weeks’ gestation reflects the AAP policy for RSV prophylaxis: infants born at 29 to 32 weeks’ gestation receive palivizumab if they are younger than 6 months at the start of the RSV season, and infants born at 26 to 28 weeks’ gestation receive prophylaxis if they are younger than 12 months at the start of the RSV season, ie, infants born at 26 to 28 weeks’ gestation generally received a higher total number of palivizumab injections and, thereafter, a higher cost of RSV prophylaxis than infants born at 29 to 32 weeks’ gestation. With the second scenario in which we included the health effects associated with the potential increase in asthma rates among children with RSV infections, we found that the ICERs are greater than $200 000 per quality-adjusted life-year for all gestational ages. Our model was most sensitive to variation in the quality of life with asthma, with ICERs less than $200 000 per quality-adjusted life-year for some gestational ages (infants born at 29 to 30 weeks’ gestation) when the quality of life with asthma was reduced to 0.80, and to variation in the cost of palivizumab, with ICERs less than $100 000 per quality-adjusted life-year for some gestational ages (infants born at 29 and 30 weeks’ gestation) when palivizumab costs were only 25% of their current values. The cost-effectiveness of the current guideline for RSV prophylaxis does not compare favorably with many accepted interventions, numerous vaccinations for children, or other health care for premature infants.

Our analyses reveal 2 main explanations for these findings. First, the use of palivizumab results in substantially increased expected costs. Second, the use of palivizumab results in very small increases in expected quality-adjusted life-years for 3 reasons: (1) there is no evidence of, nor did we model, a mortality benefit to the use of the prophylaxis; (2) there is no evidence of long-term improvement in the quality of life associated with its use; and (3) if there is an improvement in quality-adjusted life-years owing to a reduced prevalence of asthma, the

### Table 4. One-way Sensitivity Analysis in the Model Without Increased Risk of Asthma

<table>
<thead>
<tr>
<th>Variable (Range)</th>
<th>26-wk Gestation</th>
<th>28-wk Gestation</th>
<th>29- to 30-wk Gestation</th>
<th>32-wk Gestation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficacy of palivizumab (0.75-0.95)</td>
<td>511-4671</td>
<td>6452-6138</td>
<td>2381-2137</td>
<td>3396-3258</td>
</tr>
<tr>
<td>Costs of RSV hospitalization ($8000-$10 520)</td>
<td>5308-7119</td>
<td>6590-6315</td>
<td>2945-1883</td>
<td>341-3280</td>
</tr>
<tr>
<td>Cost of palivizumab assuming no drug wastage</td>
<td>4254</td>
<td>5475</td>
<td>1758</td>
<td>2671</td>
</tr>
<tr>
<td>Costs of palivizumab vials (25%-200% of current price)</td>
<td>511-11251</td>
<td>1240-13402</td>
<td>337-5448</td>
<td>795-6905</td>
</tr>
</tbody>
</table>

Abbreviation: RSV, respiratory syncytial virus.
*Incremental expected costs = expected costs for prophylaxis group – expected costs for no-prophylaxis group.

### Table 5. Sensitivity Analysis in the Model With Increased Risk of Asthma

<table>
<thead>
<tr>
<th>Variable (Range)</th>
<th>26-wk Gestation</th>
<th>28-wk Gestation</th>
<th>29- to 30-wk Gestation</th>
<th>32-wk Gestation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficacy of palivizumab (0.75-0.95)†</td>
<td>830-152678015</td>
<td>1500351-1068307</td>
<td>675780-442594</td>
<td>185500-1516839</td>
</tr>
<tr>
<td>Increased risk of asthma‡</td>
<td>830-1526560297</td>
<td>1500351-1019791</td>
<td>675780-454458</td>
<td>1587525-1079368</td>
</tr>
<tr>
<td>Length of increased risk of asthma (7.5-10.0 y)‡</td>
<td>830-152545404</td>
<td>1500351-993385</td>
<td>675780-458472</td>
<td>1587525-1058103</td>
</tr>
<tr>
<td>Quality of life in infants with asthma (0.80-0.89)†</td>
<td>199529-830152</td>
<td>360651-1500351</td>
<td>216092-906309</td>
<td>450593-1550000</td>
</tr>
<tr>
<td>Cost of palivizumab assuming no drug wastage‡</td>
<td>685720</td>
<td>1268679</td>
<td>657780</td>
<td>1481965</td>
</tr>
<tr>
<td>Cost of RSV hospitalization ($8000-$10 520)‡</td>
<td>862721-797583</td>
<td>1532920-1467782</td>
<td>708883-642876</td>
<td>1887132-1922868</td>
</tr>
<tr>
<td>Costs of palivizumab vials (25%-200% of current price)‡</td>
<td>56938-1861103</td>
<td>264952-3147549</td>
<td>37858-1526342</td>
<td>407583-3784891</td>
</tr>
<tr>
<td>Targeted use policy</td>
<td>103053</td>
<td>216830</td>
<td>280083</td>
<td>NA</td>
</tr>
</tbody>
</table>

Abbreviations: NA, not applicable; RSV, respiratory syncytial virus.
*Incremental cost-effectiveness ratio = (cost of palivizumab prophylaxis − cost of no prophylaxis)/(quality-adjusted life-years for palivizumab prophylaxis − quality-adjusted life-years for no prophylaxis).
†The base-case values of the variables are reported in Table 1.
‡The base-case values of the variables are reported in Table 2.
§Under the targeted policy, these infants would not receive palivizumab.
value of the improvement is likely to be small. These explanations for the relatively small potential long-term quality of life effects suggest that the overall welfare effects of the prophylaxis strategy will be driven by the cost consequences. Given the current costs of palivizumab, the reduction in other medical and nonmedical costs is simply not great enough to offset the drug costs. Our formulation of a targeted use policy, however, would be considered cost-effective for more restricted use among infants born at 26 or 27 weeks' gestation, but it is based on the assumption that drug wastage could be eliminated.

Our study has several limitations. First, the cost and length of hospitalization was assumed to be equal for all gestational ages. This assumption will bias our base-case model findings toward improved cost-effectiveness in the more premature infants and worse cost-effectiveness in the less premature infants. Second, the costs of asthma were based on data collected during 1985 to 1994. Finally, 1 assumption was made in our base-case analysis that deliberately biased our results toward improved cost-effectiveness of RSV prophylaxis. We assumed that the weights of the infant at the time of discharge and the time of injections are at 10% of the growth curve. This assumption will markedly reduce the cost of prophylaxis for different gestational ages.

CONCLUSIONS

In conclusion, our model is the first to our knowledge to study the cost-effectiveness of RSV prophylaxis by specific gestational age, to evaluate the implication of the possible increased risk of asthma on the economic analysis of RSV prophylaxis, and to integrate measures of morbidity (quality of life). We found that the current AAP recommendations for the use of palivizumab as RSV prophylaxis in premature infants without chronic lung disease are not cost-effective by today's standards. Our analyses support the implementation of more restrictive guidelines for RSV prophylaxis for these infants. Additional studies are needed to identify the best way to target RSV prophylaxis guidelines to enhance the cost-effectiveness of palivizumab. We found evidence that long-term health consequences of RSV are central to the determination of the cost-effectiveness of the intervention. In analyses where asthma following RSV infection was considered severe with profound worsening in quality of life (0.8) compared with quality of life without asthma (0.92), palivizumab was marginally cost-effective only for infants born at 26, 29, or 30 weeks' gestation.

Accepted for Publication: June 22, 2006.

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Acknowledgment: We acknowledge Kenneth McConnochie, MD, MPH, and Kristine Palmer, MD, for their help in reviewing the manuscript.

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“In the midst of your illness, you will promise a goat, but when you have recovered, a chicken will seem sufficient.”
—African proverb