Implementation of a Palivizumab Order Panel to Decrease Inappropriate Use

Nada M. Rida, BS; Alison Tribble, MD; and Kristin C. Klein, PharmD

OBJECTIVE Palivizumab is a monoclonal antibody used to prevent infection from respiratory syncytial virus (RSV) in certain patients who are at high risk for complications. A previous medication use evaluation (MUE) demonstrated 12% of our palivizumab use did not meet criteria for use. Prior to the start of the 2016–2017 RSV season, an order panel was implemented requiring prescribers to select the approved criterion for each patient prescribed palivizumab. In addition, our restriction policy changed to state that palivizumab use outside of preapproved criteria would require authorization from pediatric infectious diseases or the antimicrobial stewardship team. An MUE was conducted during the summer of 2017 to determine whether the order panel had an impact on appropriate prescribing of palivizumab.

METHODS Medication orders for patients who received palivizumab from December 2015 to April 2016 and from December 2016 to April 2017 were reviewed to determine the proportion of patients who did not meet the preapproved restriction criteria. Charts were reviewed to verify indications of palivizumab for each patient during both seasons. A χ^2 test was used to compare the proportion of inappropriate orders between the 2 seasons.

RESULTS During the 2015–2016 RSV season, of the 80 palivizumab orders, there were 11 inappropriate administrations (13.8%). During the 2016–2017 RSV season, 70 orders were administered to patients, and 4 doses (5.7%) were inappropriate. The cost of palivizumab increased from year 1 to year 2 (acquisition cost of \$2477.44 per 100 mg/mL vial during year 1, \$2613.71 per 100 mg/mL vial during year 2). An estimated cost avoidance of \$12,807.18 was observed due to the decrease in the number of inappropriate administrations of palivizumab following implementation of the order panel ($n = 7$). There was an overall reduction in the number of inappropriate orders from year 1 to year 2 (8.1%); however, the reduction was not significant ($p = 0.102$).

CONCLUSIONS Following the implementation of the order panel plus restriction policy, we observed a decrease in the proportion of inappropriate doses that were administered from the preimplementation period to the postimplementation period, which also resulted in a cost avoidance of approximately \$13,000.

ABBREVIATIONS MUE, medication use evaluation; RSV, respiratory syncytial virus

KEYWORDS cost savings; guidelines; order panel; palivizumab

J Pediatr Pharmacol Ther 2019;24(1):58–60

DOI: 10.5863/1551-6776-24.1.58

Introduction

Palivizumab (Synagis, AstraZeneca, Wilmington, DE) is a recombinant monoclonal antibody that is approved by the Food and Drug Administration to prevent lower respiratory tract infections caused by the respiratory syncytial virus (RSV). RSV is a virus that causes mild, coldlike symptoms, which usually resolve within a couple of weeks for most patients. According to the Centers for Disease Control and Prevention, RSV is the most common cause of bronchiolitis and pneumonia in children younger than 1 year.¹ These infections can be life-threatening in certain high-risk infants and children, including those with prematurity, chronic lung disease, and congenital heart disease, for whom palivizumab may be useful. At our institution, prophylaxis with paliv-

zumab begins on or about December 1 and ends on or about April 1 each season, depending on the rate of positivity for RSV in the surrounding community.

In the fall of 2014, the American Academy of Pediatrics revised guidelines for the use of palivizumab for protection against RSV, providing stricter criteria for its administration.² During the 2013–2014 RSV season, our institution spent an additional \$250,000 on palivizumab compared with the prior season. Because of the revised guidelines and the dramatic change in drug expenditures for palivizumab, our institution revised the criteria for use of palivizumab to align more closely to the updated American Academy of Pediatrics recommendations.

A medication use evaluation (MUE) done at our institution in 2015 demonstrated a 12% rate of inappropriate

Table. Palivizumab Criteria for Use

Code	Indication
1	First year of life and born before 29 wk, 0 days' gestation
2	First year of life and born before 32 wk, 0 days' gestation with FiO_2 need >21% for at least 28 days after birth
3	First year of life and hemodynamically significant congenital heart disease
4	First year of life and neuromuscular or congenital abnormalities that impair ability to clear airway secretions
5	Second year of life, born before 32 wk, 0 days' gestation, with chronic lung disease and requirement for continued medical support
6	Second year of life, age <2 yr, and cardiac transplantation during the RSV season
7	Age <2 yr, profoundly immunocompromised during RSV season
8	Other (pediatric infectious diseases approval between 7 am and 11 pm)

FiO_2 , fraction of inspired oxygen; RSV, respiratory syncytial virus

palivizumab use. To address this issue, an order panel was created prior to the start of the 2016–2017 RSV season. The order panel required providers to select an appropriate indication for the use of palivizumab. In addition, palivizumab was added to the list of antimicrobials that require approval by pediatric infectious diseases or the pediatric antimicrobial stewardship team for any patient who did not meet the preapproved criteria. A second MUE was conducted evaluating the use of palivizumab from December 2015 to April 2016 and from December 2016 to April 2017, the 2 seasons surrounding the most recent changes to the palivizumab ordering process. The goal of this MUE was to determine whether the implementation of the order panel resulted in fewer inappropriate palivizumab orders being administered.

Materials and Methods

A retrospective chart review was conducted to evaluate all inpatient palivizumab doses that were ordered and administered during December 2015 to April 2016 (year 1) and from December 2016 to April 2017 (year 2). Orders were reviewed for appropriateness using the criteria listed in the Table. Information collected included the patient's age, dose of palivizumab, date of administration, and indication for use. Charts were reviewed for each cohort to verify patients met criteria for use. Inappropriate administration of palivizumab was classified as any patient who did not meet the criteria for use or who received more than 1 inpatient dose during a single hospitalization, which also goes against our policy for use. For patients who received more than 1 dose of palivizumab during a single hospitalization, 1 of the doses was considered appropriate if the patient met the criteria for use. During year 2, palivizumab doses that were approved by pediatric infectious diseases were classified as appropriate. A χ^2 test was calculated to determine whether there was a significant change in the inappropriate use of palivizumab following the implementation of the order panel and restriction policy.

Results

The most common indication for use of palivizumab at our institution was hemodynamically significant congenital heart disease during the first year of life. Additional trend data regarding indications for palivizumab use during the 2 seasons are described in the Figure.

During year 1, 80 orders for palivizumab were verified and administered. There were 11 inappropriate administrations of palivizumab (13.8%) in this season. Six of these patients, who each received 1 dose, did not meet one of the criteria for use. Additionally, 3 patients were given a total of 5 doses of palivizumab during single inpatient visits, against policy.

During year 2, 70 orders were verified and administered to patients. A total of 4 doses (5.7%) were inappropriate. Two patients, who each received 1 inpatient dose of palivizumab, had an appropriate indication selected upon order entry, but chart review revealed the patients did not meet any of the preapproved criteria. The remaining inappropriate doses were given to 2 patients who had received an additional dose during the same inpatient visits (i.e., 2 doses during a single admission). Although there was an 8.1% decrease in the number of inappropriate orders, no significant difference was detected between the preimplementation group and the postimplementation group ($p = 0.102$). When repeated doses were excluded, there still was no significant difference in the proportion of inappropriate doses from year 1 to year 2 (8% vs. 3%, respectively, $p = 0.175$).

The cost of palivizumab 100 mg/mL at our institution during each season was evaluated to estimate the cost avoidance following implementation of the order panel. The cost of palivizumab increased between the 2015–2016 season and the 2016–2017 season (\$2477.44 during year 1, \$2613.71 during year 2). The average dose of palivizumab prescribed in 2016–2017 was 70 mg. Using this average dose per administration, an estimated cost avoidance of \$12,807.18 was observed due to a decrease in the number of inappropriate ad-

Figure. Palivizumab use during 2015–2016 and 2016–2017 respiratory syncytial virus (RSV) seasons.

ministrations of palivizumab following implementation of the order panel and restriction policy (n = 7).

Discussion

The American Academy of Pediatrics implementation of stricter guidelines for palivizumab use facilitated an opportunity to curtail inappropriate prescribing to patients who do not meet indications for use at our institution. The implementation of an order panel required providers to select a specific indication for each patient for which palivizumab was prescribed based on preapproved criteria which align with the American Academy of Pediatrics' criteria for use. Following implementation of the panel and restriction policy, there were only 4 patients who received inappropriate doses of palivizumab, compared with 11 patients in the season prior. Following implementation of an order panel, our institution avoided approximately \$13,000 in costs due to a decrease in inappropriate use of palivizumab. Other cost avoidance strategies used at our institution include batching doses and sharing vials, and dispensing palivizumab on only select days of the week (Mondays and Thursdays). Similar measures may be used by other institutions that are not able to implement order panels.

An order panel requiring prescribers to select appropriate criteria for palivizumab use combined with a stringent restriction policy may be a useful tool that other institutions can use to discourage excessive use of palivizumab and to decrease medication costs.

ARTICLE INFORMATION

Affiliations Department of Pharmacy (NMR, AT, KCK), C.S. Mott Children's Hospital, Ann Arbor, Michigan, College of Pharmacy (NMR, KCK), University of Michigan, Ann Arbor, Michigan, Department of Pediatrics (AT), C.S. Mott Children's Hospital, Ann Arbor, Michigan

Correspondence Kristin C. Klein, PharmD;
kriklein@med.umich.edu

Disclosure The authors declare no conflicts or financial interest in any product or service mentioned in the manuscript, including grants, equipment, medications, employment, gifts, and honoraria. The authors had full access to all the data and take responsibility for the integrity and accuracy of the data analysis.

Acknowledgment At the time of this study Nada M. Rida was a Doctor of Pharmacy student.

Accepted May 28, 2018.

Copyright Published by the Pediatric Pharmacy Advocacy Group. All rights reserved.
For permissions, email: matthew.helms@ppag.org

REFERENCES

- Centers for Disease Control and Prevention. Respiratory syncytial virus infection (RSV). March 7, 2017. <http://www.cdc.gov/rsv/index.html>. Accessed December 19, 2018.
- American Academy of Pediatrics Committee on Infectious Diseases; American Academy of Pediatrics Bronchiolitis Guidelines Committee. Updated guidance for palivizumab prophylaxis among infants and young children at increased risk of hospitalization for respiratory syncytial virus infection. *Pediatrics* 2014;134(2):415–420.