Improving Palivizumab Compliance Through a Pharmacist-Managed RSV Prevention Clinic

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OBJECTIVES Palivizumab is a monoclonal antibody approved for the prevention of serious lower respiratory tract infections caused by respiratory syncytial virus (RSV) in high-risk pediatric patients. While palivizumab is more effective if used correctly, compliance with the monthly dosing is suboptimal. We established a pharmacist-managed RSV prevention clinic in an effort to improve compliance. The primary objective of this study was to determine the impact of a pharmacist-managed RSV prevention clinic on palivizumab compliance.

METHODS A chart review was performed. Patients who received palivizumab between September 2009 and April 2012 were identified. Compliance was determined as the number of patients who received eligible doses at 28- to 30-day intervals, consecutively.

RESULTS One hundred seventy-two patients received at least 1 dose of palivizumab. An average of 92% of patients who received at least 1 dose subsequently received all doses of palivizumab during the RSV season. Of those, 88% received all eligible doses in consecutive 28-to 30-day intervals.

CONCLUSION A pharmacist-managed RSV prevention clinic can assist physicians in the prevention of RSV by increasing compliance with palivizumab dosing.

ABBREVIATIONS CHD, congenital heart disease; CLD, chronic lung disease; RSV, respiratory syncytial virus; RSVPC, RSV Prevention Clinic

KEYWORDS compliance; infant; palivizumab; respiratory syncytial viruses

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Introduction

Respiratory syncytial virus (RSV) is a major cause of bronchiolitis and lower respiratory tract infections among infants and children younger than 1 year.^{1–3} Estimates show that approximately two-thirds of all infants are infected with RSV before their first birthday and nearly all children have been infected by 2 years of age.^{4,5} Respiratory syncytial virus infection results in the hospitalization of approximately 57,000 children annually.⁶ While mortality is less than 1% overall in patients hospitalized with RSV, children with heart or lung disease have a risk of mortality as high as 3.4% and 3.5%, respectively.⁷

Palivizumab is a humanized monoclonal antibody approved for the prevention of serious lower respiratory tract infections caused by RSV in high-risk pediatric patients. While palivizumab is more effective if used as prescribed, compliance with the monthly intramuscular dosing schedule is often suboptimal. The Palivizumab Outcomes Registry Study⁸ determined that only 59% of infants received the appropriate number of doses on time. Several interventional programs have attempted to improve compliance with palivizumab prophylaxis,

but no optimal way to improve compliance has been identified.^{8–10}

In a position paper, the American College of Physicians–American Society of Internal Medicine supported pharmacist-physician collaborative practice agreements.¹¹ Since then there is a growing body of literature demonstrating improved medication compliance, cost saving, and increased patient satisfaction with pharmacist-managed ambulatory clinics. Most notably, pharmacists are established in clinics that involve anticoagulation, asthma, hyperlipidemia, and hypertension management. Pharmacist-managed ambulatory services have expanded to include but are not limited to the management of smoking cessation,¹² diabetes,^{13,14} latent tuberculosis,¹⁵ hepatitis C,¹⁶ and influenza vaccination.¹⁷

In 2009, we established a pharmacist-managed RSV prevention clinic. The clinic was primarily established because each year at the end of RSV season, the pharmacy was inundated with unused vials of palivizumab from the community practices that are part of the health system. Based on the number of unused vials, it was estimated that compliance with palivizumab dosing was 27%. The clinic was developed

by a multidisciplinary team that included pharmacists, pediatricians, nurses, and business and clerical support personnel. The clinical pharmacy specialist for general pediatrics was primarily responsible for organizing and overseeing the clinic. One or 2 postgraduate year 1 residents (depending on the year) were also required to be involved in the clinic as part of their longitudinal ambulatory care experience. Most of the patients seen in the clinic were infants discharged from the Neonatal Intensive Care Unit at Children's Hospital of The King's Daughters. Eligibility was based on guidelines published by the American Academy of Pediatrics (AAP) in 1998 and subsequently revised in 2003 and 2009.^{18–20} Each patient received third-party payor approval for palivizumab administration. Once approved, the pharmacist or resident contacted the parent or caregiver to set up an appointment for palivizumab administration in the General Academic Pediatrics Clinic at Children's Hospital of The King's Daughters. During the 20-minute appointment the pharmacist or resident provided education. The education was standardized to include general information about RSV, the importance of receiving palivizumab, and steps to decrease RSV exposure and transmission. Printed information was also given to the parent or caregiver. The pharmacist or resident administered palivizumab to the patient. They were also responsible for scheduling follow-up appointments and were available to address concerns or questions the parent or caregiver may have had after they returned home. During subsequent appointments the pharmacist or resident not only administered the palivizumab, but also used it as an opportunity to re-educate parents or caregivers.

The primary objective of this study was to determine the impact of a pharmacist-managed RSV prevention clinic on palivizumab compliance. The secondary objective was to evaluate parent or caregiver satisfaction, and physician satisfaction, with the pharmacist-managed clinic.

Methods

This study was approved by the Institutional Review Board of the Eastern Virginia Medical School. All children who received palivizumab between September 2009 and April 2012 in the General Academic Pediatrics Clinic were identified. A medical chart review was then performed. Data collected included demographic data, the indication for palivizumab use, and the number of doses administered. Compliance was determined as the number of patients who received eligible doses at 28- to 30-day intervals, consecutively. The number of eligible doses was based on guidelines previously published by the AAP.^{18–20} To determine parent or caregiver satisfaction, an anonymous customer satisfaction survey was developed. It was a 5-question survey and responses were based on the Likert scale. The parent or caregiver was asked to complete the survey

at the conclusion of the initial visit to the RSV Prevention Clinic. Additionally, the physicians and staff also completed the survey at the end of the RSV season to evaluate their satisfaction with the clinic.

Results

One hundred eighty-six patients were eligible to be seen in this clinic and to be included in this study. Of these, 14 patients were never seen in this clinic and were excluded from this study. One hundred seventy-two patients received at least 1 dose of palivizumab in the RSV Prevention Clinic. Patient characteristics for the 172 patients are listed in Table 1. On average, 92% of all eligible patients received at least a single dose of palivizumab in the RSV Prevention Clinic. Seventy-one patients received at least a single dose during the 2009–2010 season and 53 and 48 patients received at least 1 dose during the 2010–2011 and 2011–2012 RSV seasons, respectively. Furthermore, an average of 92% of infants who received at least 1 dose of palivizumab subsequently received all doses during the RSV season. We also evaluated how many infants received doses at consecutive 28- to 30-day intervals, based on the manufacturer's recommendation. An average of 88% received all palivizumab at 28- to 30-day intervals, consecutively. These results are summarized in Table 2.

Parent/caregiver education was also emphasized at each clinic visit. One hundred ninety-six anonymous surveys were given to a parent/caregiver and completed at the conclusion of their initial clinic visit. Ninety-nine percent of responders felt that the education provided was very valuable and were very satisfied with the care the pharmacist provided. With regard to physician and staff satisfaction, physicians and staff were surveyed to evaluate their satisfaction with the pharmacist-managed clinic at the end of RSV season. One hundred percent of the 11 respondents felt the clinic was beneficial to patients and families. Ninety-one percent felt parents/caregivers were more informed about RSV and palivizumab. It was the opinion of the responders that compliance with palivizumab improved, and that pharmacists running the clinic were the primary reason for the improvement.

Discussion

The results of our study indicate that pharmacists collaborating with pediatricians can improve compliance with palivizumab administration. Pharmacists are in a unique position to impact patient care in this population owing to their patient accessibility, immunization training, and their ability to educate caregivers about RSV and the importance of compliance with medication regimens. Frogel and colleagues²¹ identified risk factors for non-compliance, which included tobacco-smoking families, physician office administration, Medicaid enrollment, minority descent, and lack of transportation.

Table 1. Patient Characteristics

	2009–2010 (n = 71)	2010–2011 (n = 53)	2011–2012 (n = 48)
Prematurity, No. (%)	52 (73)	35(66)	35 (73)
Age, wk			
<28 6/7, No.	12	13	16
29–31 6/7, No.	16	12	15
32–34 6/7, No.	24	10	4
Sex, No. (%)			
Female	32 (45)	26 (49)	28 (58)
Male	39 (55)	27 (51)	20 (42)
Race, No. (%)			
African American	64 (90)	43 (81)	40 (83)
Hispanic	—	1 (2)	1 (2)
Asian	1 (1)	8 (15)	2 (4)
Caucasian	6 (9)	1 (2)	5 (10)
Diagnosis, No. (%)			
CLD	8 (11)	8 (15)	5 (10)
CHD	11 (16)	3 (6)	7 (15)
Neuromuscular disease	—	3 (6)	—
Congenital airway abnormalities	—	2 (4)	—
Other pulmonary abnormalities	—	2 (4)	1 (2)
Third-party payor, No. (%)			
Medicaid	71 (100)	53 (100)	48 (100)

CHD, congenital heart disease; CLD, chronic lung disease

The potential for non-compliance in our patient population was significant. Most of our population consisted of minorities, and all of the patients were enrolled in Medicaid. While this is the first study describing the positive impact of pharmacists on compliance with palivizumab dosing, it is not the first study demonstrating that non-physician health care providers, functioning as physician extenders, improve compliance with palivizumab dosing.

Singleton and colleagues²² evaluated compliance when palivizumab was administered by physician extenders in local clinics as compared to when doses were administered in a hospital-based clinic. Their study included 179 infants of Alaskan Native descent in the remote Yukon Kuskokwim Delta region of Alaska. Palivizumab doses were either administered by physician extenders in local clinics or at a regional hospital. Ninety percent of projected palivizumab doses were administered by the physician extenders in the local clinics as compared to 74% of doses given at the regional hospital. These authors concluded that having physician extenders administer palivizumab improved compliance. Additionally, Marshall and colleagues²³ studied the impact of administering palivizumab in a nurse-led community clinic. Thirty-two infants were

included in their study. Although they did not specifically study the impact on compliance, they were able to demonstrate an 11% reduction in overall cost and a 43% reduction in the cost per palivizumab dose. Additionally, none of the children who received palivizumab in the nurse-led clinic were admitted for an RSV-associated infection.

Other investigators have also attempted to administer palivizumab in innovative ways in an effort to improve compliance. For example, home administration of palivizumab was shown to be an effective way to improve compliance. Eight published studies to date have demonstrated a significant improvement in palivizumab compliance rates when palivizumab is administered at home.^{8,24–26} Golombek and colleagues²⁷ compared compliance rates when palivizumab was administered in home by a health care agency as compared to when palivizumab was administered in a physician's office. A total of 1446 infants were included in their study. In the home setting, 98% of doses were given in a timely fashion as compared to 89% of doses given in the pediatrician's office ($p < 0.05$). Additionally, significantly fewer infants who received palivizumab at home were hospitalized with RSV than were infants who received palivizumab at the pediatrician's office.

Table 2. Respiratory Syncytial Virus Prevention Clinic Outcomes

	RSVPC Season					
	2009–2010 (N = 75)		2010–2011 (N = 57)		2011–2012 (N = 54)	
	n/N	%	n/N	%	n/N	%
Patients who received at least 1 dose of palivizumab	71/75	95	53/57	93	48/54	89
Patients who received all doses out of those who received at least 1 dose	63/71	89	50/53	94	45/48	94
Patients who received all eligible doses in 28- to 30-day intervals, consecutively, out of those who received at least 1 dose	60/71	85	47/53	89	43/48	90

RSV, respiratory syncytial virus; RSVPC, RSV Prevention Clinic

These authors concluded that better compliance and fewer hospitalizations were associated with home administration of palivizumab than with palivizumab administration in the pediatrician's office. Similarly, Frogel et al⁸ demonstrated that infants who received palivizumab at home had better compliance with drug administration than those who received palivizumab in a clinic or physician's office. These infants also had a lower incidence of RSV-associated hospitalizations than infants who received palivizumab in a clinic or physician's office. Similarly, our pharmacist-managed RSV Prevention Clinic was an innovative way to administer palivizumab. We also demonstrated compliance rates in our clinic that were similar to the compliance rates demonstrated in these studies.

A number of factors contributed to the success of this clinic. First, having a clinic dedicated to palivizumab administration was invaluable. Since the clinic was solely responsible for scheduling patient visits, medication acquisition, medication administration, and patient follow-up, it was unlikely that patients would be overlooked or lost to follow-up. Afghani and colleagues⁹ also demonstrated similar results by establishing a single clinic responsible for palivizumab administration. Through this single clinic they were able to improve adherence to AAP guidelines for palivizumab. They were also able to decrease the number of unnecessary injections, and decrease the number of palivizumab doses that were given off schedule.

Secondly, caregiver education was an important part of the clinic's success. Ninety-nine percent of parents/caregivers felt that the education provided was valuable. Parents and caregivers were provided general information about RSV, the importance of receiving palivizumab as scheduled, and steps to decrease RSV exposure and transmission. Parent/caregiver education was emphasized at each clinic visit. Other investigators also demonstrated the importance of education in improving compliance with palivizumab dosing. Roberts and colleagues¹⁰ implemented extensive education about RSV into their initial palivizumab visit. They improved compliance with palivizumab administration

from 25% to 71%. In comparison, we improved compliance to 88%. We feel that we improved compliance to a slightly greater extent because we extensively educated the caregivers at each visit, not just during the initial visit. Furthermore, all physicians and staff felt the clinic was beneficial to patients and families. Additionally, almost all felt parents/caregivers were more informed about RSV and palivizumab. It was the opinion of the responders that compliance with palivizumab improved and that pharmacists running the clinic was the primary reason for the improvement. Additionally, they felt that similar programs would be beneficial to other pediatric practices.

There are a number of issues that need to be considered before additional pharmacist-managed RSV prevention clinics can be developed. First, depending on state regulations, pharmacists may or may not be allowed to administer palivizumab, and they may or may not be allowed to give intramuscular injections to children. The pharmacist who was primarily responsible for our clinic was also credentialed by the Professional Staff Credentialing Committee at Children's Hospital of The King's Daughters to administer palivizumab injections. Second, the number of patients eligible to receive palivizumab is decreasing; therefore, the need for an RSV prevention clinic may also lessen. In 2014 the AAP again revised their guidelines further restricting which patients are eligible to receive palivizumab and the number of doses they are eligible to receive.²⁸ Furthermore, many third-party payors also further restricted their criteria for approving palivizumab in older, "less risky," premature infants. This may translate into fewer patients being seen in our clinic and, therefore, fewer doses being administered by today's standards.

We conclude that a pharmacist-managed RSV prevention clinic can assist physicians in the prevention of RSV infection in infants at high risk for life-threatening illness. A pharmacist-managed RSV prevention clinic improved compliance with palivizumab administration. Overall, parents or caregivers, physicians, and staff were satisfied with the education the pharmacists provided.

ARTICLE INFORMATION

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