

# PEDIANEWS

*The Official Newsletter of*  
**RxPups - Student Society of Pediatric Advocates**

## What's New with RxPups ?

This semester the Student Society of Pediatric Advocates (SSPA) at the University of Georgia College of Pharmacy adopted a new name, RxPups - SSPA. RxPups has also added new members, community service projects, and educational opportunities to this year's agenda.

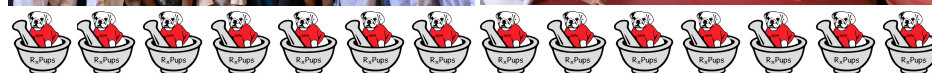
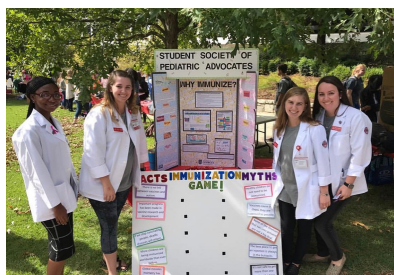
The mission of RxPups is to bring awareness to the proper use of medication therapy in pediatric populations through various service and education-based initiatives. Service activities center around lending our medication-based knowledge to pediatric patients and their parents in our community. Overall, RxPups advocates for the safety and happiness of young patients while learning and having fun along the way.

Members attended 3 general body meetings during the fall semester along with a presentation on Childhood Cancer given by our very own, Kayleigh Greene. Members use these meetings and presentations to gain knowledge about the field of pediatric pharmacy. Throughout the fall semester, members presented on the importance of immunization to students at Pharmtoberfest (UGA College of Pharmacy Health Fair) and on over-the-counter medication safety to local 1st graders and Girl Scouts at multiple community outreach events. RxPups values giving back to our community. Members volunteered at the Food Bank of Northeast Georgia to pack nutrient rich bags of food for local food-insecure students and their families.

The Executive Board of RxPups is so excited to see the events and community outreach projects come to fruition for the upcoming spring semester. Members will be presenting to the youth of Athens at Sparrow's Nest, a local community center. RxPups has also facilitated the College of Pharmacy's involvement with UGA Miracle. A fundraising competition between different professional organizations at the College of Pharmacy benefitting UGA Miracle begins January 9th. UGA Miracle raises funds for Children's Healthcare of Atlanta. Dance Marathon is UGA Miracle's largest event of the year; RxPups members will be representing the College of Pharmacy at Dance Marathon on February 23rd.

As an organization, we feel that it is our duty as future pharmacist to not only educate ourselves on pediatric pharmacy but also the community around us. The purpose of our newsletter is to educate pharmacy students about pediatric pharmacy.

If you would like to contribute to PediaNews, please contact Brooke Cottle at [brooke.cottle25@uga.edu](mailto:brooke.cottle25@uga.edu)



**UNIVERSITY OF  
 GEORGIA**  
 College of Pharmacy

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# MEASLES ON THE RISE

WRITTEN BY KAYLEIGH GREENE, PHARM.D. CANDIDATE 2021

Measles is a highly contagious viral disease that can be spread through the air by coughing or sneezing. Its hallmark symptoms are white spots inside the mouth and a rash that covers the entire body, along with flu-like symptoms and bloodshot eyes. Children and pregnant women are most at-risk for severe complications of the disease, such as pneumonia, blindness, and even death. While there is no treatment for measles, it is preventable with vaccination.<sup>3</sup>

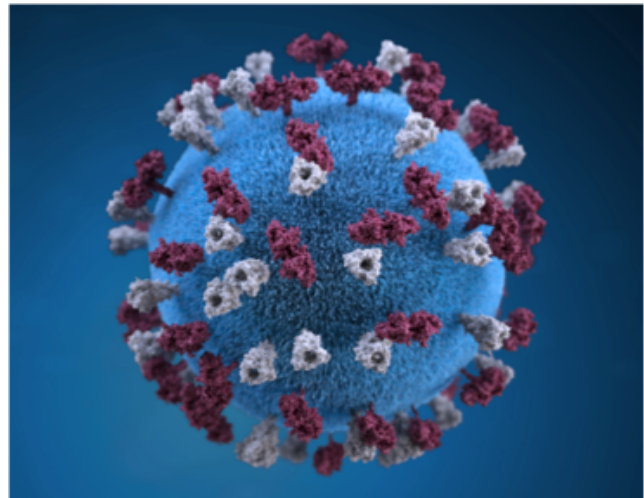
The measles vaccine has been in use since the 1960s and has been shown to be safe and effective. It is typically given as a two-dose Measles, Mumps, and Rubella (MMR) vaccine to children as part of their infancy immunizations. The World Health Organization (WHO) recommends that all non-vaccinated children and adults, regardless of age, receive the MMR vaccine to protect themselves and others.<sup>3</sup>

Fear regarding vaccinations has led to a decrease in immunization rates and an increase in outbreaks. Much of this misplaced fear stems from a study conducted in 1998 by Dr. Andrew Wakefield. This study claimed the MMR vaccine could lead to autism in healthy children. His study has since been discredited, and no study since has found such a correlation.<sup>1</sup> In 2014, The University of Sydney in Australia conducted a study of over one million children and found no relationship between the MMR vaccine, or any other vaccine, and autism.<sup>2</sup> Despite the studied safety and efficacy of the vaccine and the growing number of measles cases, individuals still remain skeptical and parents remain concerned for their children's safety.

Europe is currently experiencing an unprecedented number of measles cases in children due to decreased vaccination rates. Over 41,000 cases, primarily located in Ukraine and surrounding countries, have been reported so far this year. Thirty-seven deaths have been reported, the majority of which have been children under the age of five.<sup>5</sup>



<https://health.clevelandclinic.org/what-is-your-best-protection-against-measles/>



<https://phil.cdc.gov/details.aspx?pid=21074>

The WHO has responded to the measles outbreaks by establishing the European Vaccine Action Plan and implementing recommendations to help decrease measles cases and related deaths. Measles is one of the leading causes of childhood deaths globally. The WHO estimates that ninety-five percent of a population needs to be vaccinated in order to prevent endemic outbreaks.<sup>5</sup>

It is critical for all populations to be vaccinated, as international travel makes disease transmission a global concern. According to the CDC, the number of measles cases in the United States is currently within the predicted range, but those numbers still amount to more than a hundred cases of measles per year.<sup>4</sup> Parents should ensure that they and their children are vaccinated to protect themselves from the dangerous complications of this preventable disease.

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# BALOXAVIR MARBOXIL: THE NEWEST POTENTIAL TREATMENT OPTION FOR THE FLU

WRITTEN BY ANISHA PATEL, PHARM.D. CANDIDATE 2019

Influenza, or the flu, is one of the most common and severe infections seen around the world during the months of October to March.<sup>4</sup> Between 3 to 5 million cases of influenza, millions of hospitalizations and up to 650,000 deaths were reported worldwide in the 2017 flu season.<sup>3</sup> As the peak of the flu season approaches, we begin worrying about treatment options for the pediatric population. Over the years oseltamivir (Tamiflu) has been the drug of choice in both prophylaxis and treatment of the flu; however, there have been several reports of oseltamivir resistant strains and avian strains in which oseltamivir is not useful (H7N9, H5N1).<sup>2,5</sup> Oseltamivir and zanamivir are the only two pharmacologic treatment options approved for children currently. Oseltamivir is available in suspension form, while zanamivir is available in nasal spray form. With resistance, shortages, and the severity of the past flu season being of concern the need for new options is apparent.

In February of 2018 baloxavir marboxil (Xofluza) was approved for the treatment of influenza A and influenza B in Japan. In June of 2018, the U.S. Food and Drug Administration (FDA) accepted a New Drug Application (NDA) and granted Priority Review for baloxavir as a single-dose, oral treatment for acute, uncomplicated influenza in patients 12 years and older.<sup>1,5</sup> Baloxavir is a first-in-class agent that is proposed to inhibit the cap-dependent endonuclease proteins within the flu virus, which are an essential part of viral replication.<sup>5</sup> This proposed mechanism is different than any currently available agents' mechanism of action against the influenza virus.

In murine models of seasonal influenza and avian influenza, orally administered baloxavir was associated with rapid reductions in pulmonary viral loads and decreased mortality. In the phase three trial (CAPSTONE-1) patients 12 to 19 years of age were randomly assigned in a 2:1 ratio to receive either baloxavir or placebo within 24 hour of symptoms. Patients assessed the severity of seven influenza-associated symptoms (cough, sore throat, headache, nasal congestion, fever or chills, muscle or joint pain, and fatigue) on a 4-point scale for 2 weeks. Safety laboratory tests (hematologic tests, blood chemical tests and urinalysis) were performed routinely for 1 month, and nasopharyngeal swabs were obtained for influenza neutralizing antibody testing on day 1 and day 22.<sup>2</sup>

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The primary endpoint of the phase three trial was the time to alleviation of symptoms. The median time to alleviation of symptoms was shorter in the baloxavir group than in the placebo group (53.7 hours vs. 80.2 hours). Baloxavir was also associated with significantly more rapid decline in infectious viral load than placebo as seen in Figure 1. It was found that the difference in time to alleviation was greater when baloxavir was initiated within 24 hours of symptom onset. Some of the adverse effects seen during the trial included diarrhea, bronchitis, nasopharyngitis, sinusitis, nausea, vomiting, and headache. A majority of these adverse events however were not considered to be associated with the trial regimen but instead they were most likely associated with the virus itself.<sup>2</sup>

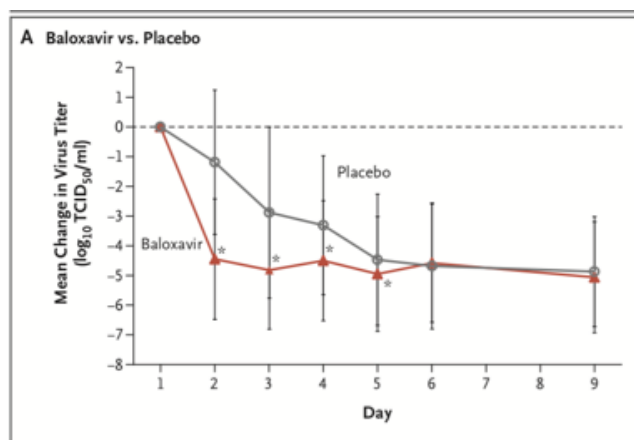


Figure 1

With cases of resistance to and shortages of oseltamivir increasing, it is crucial to begin considering new agents as treatment options to prevent hospitalizations and deaths related to the flu. As we've seen in the past, influenza is a serious infection, especially in the pediatric population in which immune systems are not yet strong and fully developed. As baloxavir nears a decision from the FDA in terms of approval, it is hoped that there will be an addition of another treatment option for cases in which oseltamivir might not be effective or the best agent of choice due to resistance.



# The Importance of the Rotavirus Vaccine

WRITTEN BY NAMITA PATEL, PHARM.D. CANDIDATE 2019

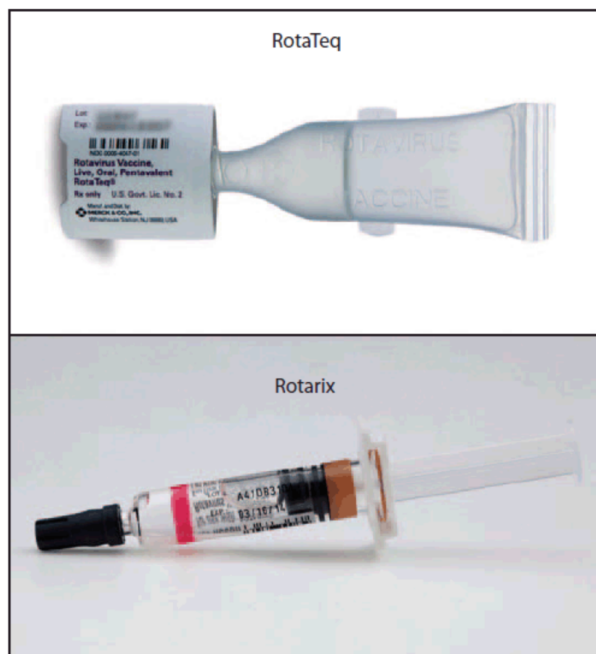
Rotavirus infection is the leading cause of diarrhea associated mortality and morbidity across the world in children younger than five years old. When a child is infected, he or she may experience severe watery diarrhea, vomiting, fever, and abdominal pain. More severe symptoms include a loss of appetite and dehydration, which can lead to dry mouth, dizziness, and decreased urination. These symptoms can be life threatening for children, thus it is crucial to learn how rotavirus is transmitted and how it can be treated.

Rotavirus is a contagious disease, most commonly spread through the fecal oral route, allowing it to become easily transmitted from person to person. It is spread when a person ingests the virus after coming in contact with the stool of an infected person. It is more likely spread during the months from December to June. Since the virus is spread easily, it is necessary to educate the public on the transmission of rotavirus. Children can spread the rotavirus before they have the symptoms, while they have symptoms and while they recover. It can be spread by putting unwashed hands in the mouth after touching contaminated objects and surfaces, by eating contaminated food, and by exposure to contaminated respiratory droplets. The small amount of fecal matter is usually invisible, making it difficult to realize when the virus is transmitted.<sup>2</sup> Transmission of the virus can potentially be avoided by washing your hands regularly and keeping objects and surfaces clean. While good hygiene can decrease the chance of infection, the best way to protect a child is to receive the rotavirus vaccine.

The rotavirus vaccine is administered to the child as oral drops. There are two vaccines in the United States, RotaTeq (RV5) and Rotarix (RV1). They both differ due to their composition and their administration schedule. RV5 is composed of five reassortant rotaviruses, both human and bovine parent rotavirus strains, administered in three doses at age 2 months, 4 months, and 6 months. RV1 is composed of one attenuated human rotavirus strain administered in two doses at age 2 months and 4 months.<sup>2,3,4</sup> The first dose is usually administered before the infant is 15 weeks old. An infant should receive all of their doses before the infant is 8 months old. Contraindications to the vaccines include children that have a history of hypersensitivity to the vaccine itself or a component of the vaccine, children with a history of severe combined immunodeficiency disease, or children with a history of intussusception. Common side effects of the vaccine are cough or runny nose, fever, vomiting and fussiness. According to the Centers for Disease Control and Prevention, nine out of ten children who receive the vaccine will be protected from severe rotavirus disease while seven out ten children will be protected from rotavirus of any degree.<sup>1</sup> Children who are vaccinated are less likely to contract rotavirus therefore it is crucial for children to receive this vaccination.

If a child is infected with rotavirus infection, there is no specific medication indicated for its treatment. Physicians usually treat the symptoms that are presented, with dehydration being the biggest concern. If the child has mild symptoms, typical treatment and recommendations include drinking plenty of fluids as well as oral rehydration fluids such as Pedialyte. For more severe cases, a child is hospitalized and given intravenous fluids. Symptomatic children should also avoid apple juice, dairy products, and sugary food; these foods can worsen a child's diarrhea resulting in a need for further medical attention.

According to a report by the Global Burden of Disease, in 2016 rotavirus infections caused 128,500 deaths and 258,173,300 incidents of diarrhea in children younger than 5 years.<sup>5</sup> The vaccine was estimated to have prevented 28,000 deaths. Based on these statistics, it is essential for parents to be educated on rotavirus and its vaccine so children receive the vaccination and future infections are prevented.



Photos/Merck & Co., Inc. (RotaTeq) and GlaxoSmithKline Biologicals (Rotarix)  
<https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6304a4.htm>

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# The Flu Ends with "U" (and Children)

WRITTEN BY KAJAL JAIN, PHARM.D. CANDIDATE 2019

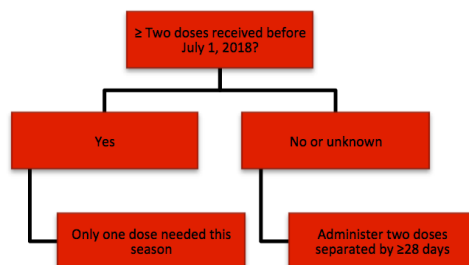
A child complains of their body hurting. They have been napping more than usual. After taking their temperature, it's 103°F. Could this be the flu? These are some common symptoms that are unique to the flu and differ from cold symptoms. Influenza is a serious viral infection that can be prevented by receiving the influenza vaccine.<sup>1</sup>

The Centers for Disease Control and Prevention (CDC) and Advisory Committee on Immunization Practices (ACIP) recommend everyone ≥ 6 months old receive a seasonal influenza vaccine. This vaccine is even more important for children that are at a high risk of complications from the flu. Table 1 identifies chronic health problems that put a child at greater risk for complications. In addition to these conditions, children younger than 5 years old, and especially children younger than 2 years old, are at higher risk of complications making it even more important to vaccinate them. Complications include pneumonia, dehydration, and worsening of long-term medical conditions such as asthma or sinus problems.<sup>3</sup>

|  |   |
|--|---|
| Neurological and Neurodevelopmental conditions | Liver disorders                                   |
| Lung disease (asthma, cystic fibrosis)         | Metabolic disorders                               |
| Heart disease                                  | Weakened immune system from medication or disease |
| Blood disorders (sickle cell disease)          | Long term aspirin therapy                         |
| Endocrine disorders (diabetes)                 | Kidney disorders                                  |

Table 1: Chronic health conditions with increased risk of complications

The CDC has specific vaccination recommendations for children between the ages of 6 months old and 8 years old receiving the influenza vaccine. If the child is being vaccinated for the first time, he or she should receive two doses administered 28 days apart. The same recommendation applies if the child had their first vaccine the previous season but did not receive two doses at that time. The first dose will "prime" the immune system, while the second dose provides immune protection. It is crucial that the immunization process is started early in the influenza season since immune protection will begin approximately two weeks after receiving the second dose of the influenza vaccine.<sup>3</sup>



The FluMist was not approved for the 2017 – 2018 influenza season. After evaluation by the ACIP in February 2018, the FluMist is recommended for the 2018 – 2019 season. Table 2 lists the vaccines approved by the ACIP for the 2018 – 2019 influenza season; any of the vaccines listed can be administered to patients with an egg allergy. If the patient's allergic reaction to eggs consists of more than hives, then they should receive the vaccine in an inpatient or outpatient medical setting that is able to recognize and manage allergic reactions; the patient should be observed for 30 minutes after receiving the vaccine. Table 3 lists contraindications and precautions for ACIP recommended influenza vaccines.<sup>2</sup>

| Name   | Presentation             | Approved Age  | Egg or Cell Culture Grown | Route           |
|--|--------------------------|---------------|---------------------------|-----------------|
| <b>Quadrivalent IIV's (IIV4s)</b>            |                          |               |                           |                 |
| Afluria                                      | 0.5 mL PFS <sup>2</sup>  | ≥ 5 years     | Egg                       | IM <sup>3</sup> |
| Fluarix                                      | 0.5 mL PFS               | ≥ 6 months    | Egg                       | IM              |
| Flulaval                                     | 0.5 mL PFS               | ≥ 6 months    | Egg                       | IM              |
|  | 5.0 mL MDV <sup>4</sup>  |               |                           |                 |
| Fluzone                                      | 0.25 mL PFS              | 6 – 35 months | Egg                       | IM              |
|  | 0.5 mL PFS               | ≥ 3 years     |                           |                 |
|  | 0.5 mL SDV <sup>5</sup>  | ≥ 3 years     |                           |                 |
|  | 5.0 mL MDV               | ≥ 6 months    |                           |                 |
| Flucelvax                                    | 0.5 mL PFS               | ≥ 4 years     | Cell Culture              | IM              |
|  | 5.0 mL MDV               |               |                           |                 |
| <b>Trivalent (IIV3)</b>                      |                          |               |                           |                 |
| Afluria                                      | 0.5 mL PFS               | ≥ 5 years     | Egg                       | IM              |
|  | 5.0 mL MDV               |               |                           |                 |
| <b>Quadrivalent LAIV<sup>6</sup> (LAIV4)</b> |                          |               |                           |                 |
| FluMist                                      | 0.2 mL prefilled sprayer | 2 – 49 years  | Egg                       | Nasal           |

<sup>1</sup>IIV – inactivated influenza vaccine  
<sup>2</sup>PFS – prefilled syringe  
<sup>3</sup>IM – intramuscular  
<sup>4</sup>MDV – multi-dose vial  
<sup>5</sup>SDV – single dose vial  
<sup>6</sup>LAIV – live attenuated influenza vaccine

| Vaccine Type | Contraindications  | Precautions   |
|--------------|--|---|
| IIV          | History of severe allergic reaction after a previous dose  | Moderate to severe illness with or without fever<br>Guillain-Barré syndrome in the past 6 weeks                                     |
| LAIV         | History of severe allergic reaction after a previous dose<br>Aspirin or salicylate containing therapy in children and adolescents<br>Children 2 – 4 years old that have a diagnosis of asthma; wheezing or asthma in the past 12 months reported by a parent; or medical record indicating wheezing in the past 12 months<br>Immunocompromised<br>Close contact with immunocompromised<br>Antiviral medication received in the past 48 hours | Moderate to severe illness with or without fever<br>Guillain-Barré syndrome in the past 6 weeks<br>Asthma in children ≥ 5 years old |

Table 3: Contraindications to Influenza Vaccines

It is recommended that the influenza vaccine be administered by the end of October, the beginning of influenza season. Doctor's offices, health departments, and pharmacies should have them available at this time. Pharmacists are able to vaccinate patients 13 years old or older without a prescription based on a protocol agreement with a physician; a patient under the age of 13 must have a prescription from a physician in order to get an influenza vaccine at a pharmacy.<sup>3</sup> It takes approximately two weeks after receiving the vaccine to build immunity and receive the protective benefits of the influenza vaccine. Due to this two-week period, full benefits of the vaccine are not seen if administered at the peak of flu season (January–February). This would put patients at greater risk for contracting the flu.<sup>3</sup>

In conjunction with the influenza vaccine, the following precautions are also recommended: limit contact with sick people; wash your hands often; clean surfaces and objects that could have the influenza virus on it; cover your mouth when sneezing or coughing; and avoid touching your eyes, nose, and mouth to limit the spread of germs.<sup>3</sup> The flu ends with you!

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