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ADVANCES IN PEDIATRICS

Advances in Pediatric Pharmacology, Therapeutics, and Toxicology

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Keywords

• Pediatrics • Pharmacology • Pharmacokinetics • Toxicology

Key points

- Pediatric research continues to expand in both the United States and in Europe as a result of ongoing efforts to promote pediatric drug development and labeling.
- Areas in major need of drug development including rare and ultra rare diseases have seen new advancements. However, drug development for other populations such as neonates continues to experience limited progress.
- Despite the progress made in 2014 and 2015 much work remains, including gathering more data on medications that are currently available and developing new, safe, and effective therapies for pediatric patients.

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INTRODUCTION

Over the past 2 years there have been numerous advancements in drug development for pediatric patients. In 2014 and 2015, the Food and Drug Administration (FDA) approved more than 70 product label changes related to pediatric populations (Table 1), resulting in more than 530 overall since the enactment of the Best Pharmaceuticals for Children Act in 2002 and the Pediatric Research Equity Act in 2003 [1]. There were more than 10 approvals of new drugs specifically for the treatment of pediatric indications in the past 2 years, including several for rare or ultrarare diseases, which reflects the major advancements that have occurred for drug development for these populations. In the European Union, there have been more than 30 new authorizations by the European Medicines Agency (EMA) for medications for use in pediatric populations. Additionally, the Paediatric Committee of the EMA has approved more than 135 new pediatric investigation plans for new studies [2,3]. The greatest numbers of pediatric investigation plans are in the areas of endocrinology and infectious disease, with 20 and 19, respectively, followed by oncology and gastroenterology. Furthermore, there have been many contributions by investigator-initiated studies that have led to a greater understanding of the use and effects of medications prescribed to children. Even though it has been recognized that there is a major need for drug development for neonates, these is still a lack of information on the safety and efficacy of drugs that are used in this population [4].

Given the numerous advancements over the past 2 years, the goal of this article is to highlight specific developments in pediatric pharmacology, toxicology, and therapeutics from January 2014 through October 2015. The updates were extracted from the FDA Pediatric Labeling Information Database, EMA Public Assessment Reports database, EMA Opinions and Decisions on Paediatric Investigation Plans database, clinicaltrials.gov, PubMed, and Embase. Articles were selected to identify important developments within various therapeutic areas.

ANESTHESIA

Sedation

Dexmedetomidine is a selective α_2-agonist that acts centrally in the brainstem to inhibit norepinephrine release, which results in sedative and anesthetic effects without causing respiratory depression [5]. It is currently FDA approved for use in adult patients for up to 24 hours while intubated and on mechanical ventilation in the intensive care setting but has been used off-label in pediatric patients as an adjunct to sedation regimens and is increasingly used as a primary sedative agent [6].

Given the lack of data surrounding dexmedetomidine usage in neonates, a phase 2/3, open-label study was performed with the goal of characterizing the safety, efficacy, and pharmacokinetic (PK) properties of dexmedetomidine in preterm and term neonates between 28 weeks and 44 weeks of gestational age [7]. The neonates were divided into 2 groups, with group 1 including