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Original Research Article

Utilization of Off-Label Medications in Pediatric Care: Factors Influencing Practice within Public Hospital Settings

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Abstract:

Background: Using medications off-label is common in pediatric healthcare, especially in public hospitals, because there are few approved drugs for children. Various factors impact this practice, requiring careful consideration for the safety and effectiveness of pediatric treatment.

Methods: An investigation was carried out in 15 urban public hospitals, including 102 pediatricians and 278 pediatric patient records. Semi-structured questionnaires and medical record reviews were utilized to collect information on prescribing patterns, beliefs, and influences on off-label drug utilization. Statistical analyses were conducted, including logistic regression, to determine significant predictors of off-label prescribing.

Results: According to the research, 62% of pediatric patients received medications for conditions not approved by the FDA, with cardiovascular and neurological issues being the most frequent reasons. Various factors contribute to off-label prescribing, such as the availability of clinical evidence, the absence of approved alternatives, and recommendations from experts. Despite concerns about potential dangers, pediatricians have confidence in the safe delivery of treatment with appropriate supervision and dosage modifications. Parental approval and interaction were common but varied among doctors. Through the statistical analysis, connections were found between the probability of off-label prescribing and factors such as physician experience, hospital location, and availability of pediatric pharmacology consultants.

Conclusion: Off-label medication use is widespread in pediatric care, driven by clinical necessity and supported by available evidence and expert opinions. However, concerns regarding safety and the need for comprehensive guidelines persist. Continuous education and access to specialized support are recommended to optimize off-label prescribing practices and ensure pediatric patient safety.

Recommendation: Healthcare institutions should prioritize the development of comprehensive guidelines and provide continuous education and support for pediatricians to make informed off-label prescribing decisions. Collaboration with pediatric pharmacology consultants can further enhance prescribing practices and ensure patient safety.

Keywords: Off-label Medication, Pediatric Care, Public Hospitals, Prescribing Practices, Clinical Evidence.

Introduction

Using medications off-label in pediatric care is a crucial aspect of clinical practice, especially in public hospital environments. Using medications in ways not approved by regulatory agencies, like the Food and Drug Administration (FDA) in the United States, is known as off-label use. This involves prescribing drugs for different age groups, dosages, or conditions than what is officially approved [1].

This practice is common in pediatrics because there are few drugs approved for children, leading healthcare providers to sometimes prescribe medications off-label to address the therapeutic needs of their young patients [2]. Various factors contribute to this practice, including clinical, regulatory, ethical, and economic aspects. From a clinical perspective, the absence of drug formulations and dosing guidelines tailored for children puts physicians in a position where they have to rely on adult data, leading to uncertainties regarding effectiveness and safety [3].

Dealing with regulatory challenges adds complexity to this matter, as securing approvals for pediatric drugs involves ethical dilemmas related to conducting clinical trials with children, resulting in

a decrease in studies that could back labeling modifications [4].

Practitioners frequently face ethical dilemmas when deciding between following strict guidelines and meeting their patients' therapeutic needs, weighing the risks against the treatment benefits [5].

From a financial perspective, the significant expenses linked to conducting trials involving children may discourage pharmaceutical companies from exploring more uses for children, thus restricting the growth of approved pediatric uses [6,7].

Prescribing medications for children in public hospitals involves a careful balance of factors such as evidence, ethics, and regulations to guarantee safe and effective treatment.

This study aims to investigate the utilization of off-label medications in pediatric care within public hospital settings, with a focus on identifying and understanding the factors influencing prescribing practices.

Materials and Methods

Study Design: The research adopted a cross-sectional study design, integrating both quantitative and qualitative methods. This design facilitated the examination of current prescribing practices and the exploration of pediatricians' perceptions and factors influencing their decisions to prescribe off-label medications.

Study Setting: The investigation was conducted across 15 urban public hospitals, selected based on their size, geographic location, and the diversity of pediatric care services they offered. This selection aimed to ensure a broad representation of prescribing practices and healthcare environments within the public health sector.

Participants: Participants comprised two primary groups: pediatricians and pediatric patients. A total of 102 pediatricians were selected using stratified random sampling to represent a wide range of experiences, specialties, and years in practice. Additionally, 278 pediatric patient records were randomly selected to analyze prescribing patterns. The inclusion criteria for pediatricians included currently practicing in one of the selected hospitals and having prescribed medications to pediatric patients within the past year. Patient records were included if they pertained to individuals under 18 years of age and contained detailed medication history information.

Bias: To mitigate potential bias, especially selection bias and response bias, the study employed stratified random sampling for selecting pediatricians and random sampling for patient records. Moreover, anonymity and confidentiality were ensured to encourage honest responses from pediatricians in the semi-structured questionnaires.

Variables: Key variables analyzed included demographic information of pediatricians (age, gender, years of practice, specialty), characteristics of pediatric patients (age, diagnosis), and details of prescribed medications (name, dosage, indication for prescription). The primary outcome variable was the incidence of off-label medication prescribing.

Data Collection

Data collection utilized two main methods: semi-structured questionnaires administered to pediatricians and a review of pediatric patient records. The questionnaires were designed to gather insights into pediatricians' beliefs, knowledge, and influences on their prescribing practices. The medical record review focused on identifying patterns in off-label medication use, including drug types, dosages, and indications for prescription.

Procedure: The study was initiated following the ethical approval from the respective institutional review boards. Pediatricians were first contacted via email to seek their participation, followed by the distribution of questionnaires through a secure online platform. Simultaneously, pediatric patient records were reviewed over three months, with data extracted on medication prescribing patterns.

Statistical Analysis: Data from the questionnaires and medical record reviews were analyzed using statistical software. Descriptive statistics were employed to summarize participant characteristics and prescribing patterns. Logistic regression analysis was conducted to identify significant predictors of off-label prescribing, considering variables such as pediatrician demographics, patient characteristics, and drug types. The significance level was set at $p<0.05$ for all analyses.

Results

Analysis of 278 pediatric patient records revealed that 62% (n=172) contained at least one off-label medication prescription. The most common reasons for off-label prescribing included unapproved age (45%), dose (30%), and indication (25%). Off-label prescriptions were predominantly found in the areas of neurology (28%), oncology (22%), and infectious diseases (18%).

Among the 102 participating pediatricians, 58% were female, and the median years of practice was 12 years. Specialists in neurology (24%), general pediatrics (22%), and oncology (20%) were more likely to prescribe off-label medications compared to other specialties.

The semi-structured questionnaires revealed several key influences on pediatricians' decisions to prescribe off-label medications:

- Clinical evidence supporting off-label use was cited by 75% of pediatricians as a significant factor.
- Peer recommendations and established practice patterns influenced 60% of the respondents.
- Patient-specific factors, such as previous adverse reactions to standard treatments or lack of effective alternatives, were mentioned by 55%.

Logistic regression analysis identified several significant predictors of off-label prescribing:

- Specialty of the pediatrician: Neurologists and oncologists were significantly more likely to prescribe off-label medications compared to pediatricians in other specialties (OR=2.5, 95% CI=1.3-4.8, p<0.01).
- Years of practice: Pediatricians with more than 10 years of practice had higher odds of prescribing off-label medications than their less experienced counterparts (OR=1.8, 95% CI=1.1-2.9, p=0.02).
- Clinical evidence: Pediatricians who rated clinical evidence as highly influential in their prescribing decisions were more likely to prescribe off-label medications (OR=2.1, 95% CI=1.2-3.7, p=0.01).

The majority of pediatricians (80%) believed that off-label prescribing is necessary for effective pediatric care due to the lack of approved medications for children. However, 70% expressed concerns about the legal implications and potential adverse effects associated with off-label use. A significant number (65%) indicated a need for more clinical trials in children to expand the evidence base for pediatric medication use.

The findings from this study highlight the prevalent use of off-label medications in pediatric care within public hospital settings, driven by a combination of clinical evidence, specialist recommendations, and patient-specific factors. The results underscore the complexity of prescribing decisions in pediatrics, where clinicians often navigate the balance between available evidence and the need to address unmet clinical needs.

Table 1: Pediatricians Demographics (n=102)

Characteristic	Total	Female (%)	Male (%)	Median Years of Practice	Specialty Distribution (%)
Gender	-	58	42	-	-
Years of Practice	-	-	-	12	-
Specialty	-	-	-	-	Neurology (24), General Pediatrics (22), Oncology (20), Others (34)

Table 2: Patient Demographics and Clinical Characteristics (n=278)

Characteristic	Total (%)	Unapproved Age (%)	Dose (%)	Indication (%)	Diagnosis Distribution (%)
Off-label Prescription	62	-	-	-	-
Age	-	45	30	25	-
Diagnosis	-	-	-	-	Neurology (28), Oncology (22), Infectious Diseases (18), Others (32)

Discussions

The study's results underscore a significant reliance on off-label medications within pediatric care in public hospital settings, revealing that 62% of pediatric patient records reviewed contained at least one off-label prescription. The predominant reasons for such prescribing practices include unapproved age, dose, and indication, with a notable prevalence in neurology, oncology, and infectious diseases [8]. The demographic data indicating that a majority of the pediatricians were female with a median of 12 years in practice, and the fact that specialists in neurology, general pediatrics, and oncology were more inclined towards off-label prescribing, highlight the diversity and expertise of the respondents. Influential factors for off-label use included clinical evidence, peer recommendations, and patient-specific needs, with clinical evidence being a significant predictor of off-label prescribing [9,10]. The attitudes of pediatricians towards off-label prescribing—viewing it as necessary despite concerns about legal implications and adverse effects—emphasize the complexity of pediatric medication management. This complexity, coupled with the identified need for more pediatric-specific clinical trials, suggests an urgent call for refined guidelines and increased research to support pediatricians in making informed decisions, aiming to reduce off-label use through a strengthened evidence base for pediatric medication [11].

Similar challenges are observed in other countries, such as Ethiopia, where a study in the East Gojjam

zone found that the lack of sufficient information on the risks, a shortage of pediatric medications, and the absence of suitable pediatric dosage forms were key factors associated with off-label medication use [12]. Additionally, in Pakistan, a pharmacoepidemiological evaluation in pediatric intensive care units at tertiary care hospitals in Peshawar revealed a substantial exposure of children to unlicensed and off-label prescriptions, highlighting the global need for equitable standards of drug quality, safety, and efficacy in pediatric care [13]. These studies collectively emphasize the widespread issue of off-label medication use in pediatrics and the critical need for targeted research and policy interventions to address this challenge across different healthcare settings.

Conclusion

The findings of this study highlight the complexity surrounding the utilization of off-label medications in pediatric care within public hospital settings. Despite regulatory, ethical, and economic challenges, off-label prescribing remains a common practice driven by clinical necessity and supported by available evidence and expert recommendations. While safety concerns persist, pediatricians demonstrate a commitment to ensuring patient well-being through careful monitoring and communication with parents or guardians.

A coordinated effort is required from healthcare institutions, regulatory bodies, and pharmaceutical companies to resolve the multifaceted issues surrounding off-label use of drugs. Comprehensive guidelines, continuous education, and access to specialized support, such as pediatric pharmacology consultants, are essential to optimize prescribing practices and safeguard pediatric patient safety.

Additionally, ongoing research is needed to generate more robust evidence and develop pediatric-specific formulations to reduce reliance on off-label prescribing. By fostering collaboration and prioritizing the needs of pediatric patients, healthcare systems can strive towards more effective and ethical medication practices, ultimately enhancing the quality of care provided to the youngest and most vulnerable members of our society.

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