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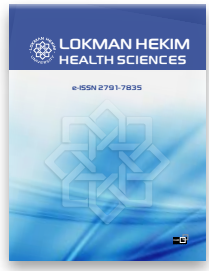

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ORIGINAL ARTICLE

General Antibiotic Use Behaviors among Parents of Pediatric Dental Patients: A Sociodemographic Assessment

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Abstract

Introduction: Misuse of antibiotics in childhood increases antimicrobial resistance. Parents play a critical role in antibiotic use behaviors. This study assesses parents' knowledge, attitudes, and behaviors regarding antibiotic use for their children. It also examines how these factors vary by sociodemographic characteristics among parents of patients at a pediatric dentistry clinic.

Methods: A cross-sectional, questionnaire-based survey was conducted with parents of children presenting to a pediatric dentistry clinic. The interview was conducted face-to-face. The questionnaire assessed antibiotic knowledge, attitudes toward antibiotic use and misuse, and sources of information. Sociodemographic data were collected, and statistical analyses were performed to evaluate associations between variables. The collected data were analyzed statistically.

Results: The study was completed with the parents of 172 children. Most parents obtained antibiotic information from physicians (83.9%) and commonly recognized penicillin and amoxicillin-clavulanic acid. Reading package leaflets (80%) and avoiding dose alterations without medical advice (95.8%) were highly reported. Significant associations were found between parental gender and antibiotic recognition ($p<0.05$), as well as between education level and both antibiotic awareness and understanding of the consequences of irrational use ($p<0.05$). Only 12.4% of parents kept antibiotics at home, and this behavior was not associated with educational status.

Discussion and Conclusion: Parental knowledge, attitudes, and general antibiotic use behaviors are significantly influenced by sociodemographic factors, particularly education level and gender. Targeted educational interventions may enhance rational antibiotic use and support public health efforts to reduce antimicrobial resistance.

Keywords: Antibiotics; Parental knowledge; Pediatric dentistry; Rational antibiotic Use; Sociodemographic factors

Childhood is a period characterized by a high incidence of infections, which corresponds to the highest rates of antibiotic use. It is also the age group most commonly associated with unnecessary and irrational antibiotic prescriptions.[1] Particularly in low- and middle-income countries, the high prevalence of infectious diseases, inadequate hygiene and infrastructure, and deficiencies in healthcare systems exacerbate the issue of irrational antibiotic use among children, making it a significant public health concern.[2] Although the sale of antibiotics without a prescription is prohibited in Türkiye, the country remains one of the highest consumers of antibiotics in the world.[3]

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Various factors have been proposed to explain the inappropriate use of antibiotics in children, including overprescription by healthcare professionals,[4] easy access to antibiotics for personal use and the limited knowledge of parents regarding antibiotics.[5,6]

Studies show that unnecessary antibiotics in children are often prescribed for ear or dental infections.[7,8] Physicians sometimes prescribe antibiotics without proper indications or for too long. Some parents initiate antibiotic use without consulting healthcare professionals. Many mothers and fathers lack sufficient knowledge about appropriate antibiotic use.[9] The tendency of parents to use antibiotics for their children varies depending on factors such as their socioeconomic status, level of education, prior experience of illness, and awareness of antibiotics.[10] The pediatric age group experiences a high incidence of febrile illnesses, making it the period with the most frequent antibiotic use. However, this is also the time when inappropriate and unnecessary antibiotic consumption is most prevalent. One contributing factor to excessive antibiotic use in children is parents' requests and their inclination to use antibiotics based on prior experiences.[11] Similarly, a study conducted in Türkiye reported that parental demands significantly influence dentists' prescribing behaviors for children.[8] Therefore, parental education, especially raising awareness among mothers, should be one of the main goals in ensuring rational antibiotic use in children. The literature clearly demonstrates the positive impact of education on antibiotic use behaviors.[12] In this context, identifying existing misconceptions, knowledge gaps, and attitudes within the community is essential to developing effective educational programs that promote rational antibiotic use.

This study aims to evaluate parents' knowledge, attitudes, and behaviors regarding general antibiotic use for their children and to examine how these variables are associated with sociodemographic factors among parents of pediatric dentistry patients.

Materials and Methods

Study Place and Design

This cross-sectional descriptive study was conducted at the Tekirdağ Namik Kemal University Oral and Dental Health Application and Research Center. A structured questionnaire was used to learn how parents understand and manage antibiotic use for their children. The study also identified patterns related to family demographic characteristics at the pediatric dentistry clinic.

Study Population and Data Collection

The study involved face-to-face interviews with the parents of 172 children aged 0–15 years who applied to the Pediatric Dentistry Clinic at the Tekirdağ Namik Kemal University Oral and Dental Health Application and Research Centre for various dental issues between February 2023 and February 2024. The study included parents (mother or father) of children aged 0–15 years who attended our center for the management of dental complaints. Parents of children with chronic illnesses that could lead to frequent antibiotic use, as well as those requiring antibiotic prophylaxis due to the risk of infective endocarditis, were excluded from the study.

Questionnaire Design

A structured questionnaire comprising 20 items was developed by the researchers for this study. The questionnaire included multiple-choice, yes/no, and Likert-type response formats. The questionnaire consisted of five sections: (1) The sociodemographic characteristics of parents and children, (2) Parental awareness of antibiotics and sources of information, (3) Antibiotic use and storage practices, (4) Purpose and method of antibiotic use, and (5) Previous dental-related antibiotic experiences.

The content and structure of the questionnaire were informed by previous studies that evaluated parents' knowledge, attitudes, and practices regarding antibiotic use in children, including those conducted in pediatric and dental settings.[13,14]

To ensure content validity, two pediatric dentistry experts and one public health specialist reviewed a preliminary version of the questionnaire. Researchers made minor clarity improvements based on their feedback. Parents then self-administered the final questionnaire while waiting in the clinic.

While waiting for their children's examinations, parents were informed about the study and asked to complete a questionnaire designed to assess their knowledge of antibiotic use on a voluntary basis. Informed consent forms were obtained from all parents. Only mothers and fathers were considered parents in this study. After completing the questionnaire, the parents and their children were admitted to the clinic for examination, during which relevant clinical data were recorded.

Ethical Considerations

Ethical approval for the study was obtained from the Non-Interventional Ethics Committee of Tekirdağ

Namik Kemal University (Date: 31.01.2023, Decision no: 2023.13.01.13) prior to its initiation. The study complied with the Helsinki rules.

Statistical Analysis

The research was designed as a cross-sectional study consisting of survey questions aimed at measuring the level of knowledge of parents about antibiotics. A convenience sampling strategy was applied, which might limit the extent to which the findings can be generalized to the wider population. Therefore, the results should be interpreted with mindful consideration of the potential selection bias associated with convenience sampling. The collected data were analyzed using frequency distributions and descriptive statistics. Categorical variables were summarized using frequencies and ages. Missing data were handled using an available-case (pairwise deletion) approach. Although the total sample consisted of 172 participants, the number of cases included in each analysis varied slightly depending on item-level missing responses. For each statistical analysis, only participants with complete data for the relevant variables were included. Normality was assessed for the numerical variables using skewness–kurtosis values and Q–Q plots, and since they demonstrated a normal distribution, they were presented as mean, standard deviation, minimum, and maximum values. Data obtained from parents were evaluated under five main categories: demographic characteristics; reason for clinic visit and affected dental region; sources of information about antibiotics and known antibiotic names; purpose and method of antibiotic use; and questions related to antibiotic use and awareness. Specifically, parental gender, educational level, and other sociodemographic characteristics were compared with outcomes such as knowledge of antibiotic names, awareness of inappropriate antibiotic use, frequency of antibiotic use, and home storage of antibiotics. Chi-square tests were applied when expected cell counts met the required assumptions, whereas Fisher's exact test was preferred in comparisons with small subgroup sizes. These tests were selected because they are appropriate for assessing relationships between categorical variables and allow for a reliable evaluation of the differences across parent groups. A significance level of $\alpha = 0.05$ was adopted for all main and sub-analyses, and the results were reported at $p<0.05$, $p<0.01$ and $p<0.001$. The statistical analyses were conducted using IBM Statistical Package for the Social Sciences Statistics version 24.0, developed by IBM Corporation (Armonk, New York, USA).

Table 1. Demographic findings

	n=172	%
Childs' gender		
Male	70	40.7
Female	102	59.3
Parents' gender		
Mother	109	63.4
Father	63	36.6
Children's age group		
1–9 years old	97	56.4
10–15 years old	75	43.6
Average age (standard deviation)	9.3 (3.0)	
Minimum–maximum	1–15	
Parents' age group		
27–39 years old	90	52.3
40–56 years old	82	47.7
Average age (standard deviation)	39.3 (5.3)	
Minimum–maximum	27–56	
Parents' education level		
Primary school	35	20.3
Secondary school	30	17.4
High school	50	29.2
University	46	26.7
Postgraduate	11	6.4

Results

A total of 200 parents participated in the study. However, those who did not respond to at least 50% of the survey questions were excluded. Therefore, 172 parents who responded to the survey were included in the study. 63.4% (n=109) of the parents were mothers and 36.6% (n=63) were fathers. 40.7% (n=70) of the parents' children were boys, and 59.3% (n=102) were girls. The average age of the children was 9.3 years. The youngest child was, and the oldest child was 15. The average age of the parents was 39.3 years. The youngest parent was 27, and the oldest parent was 56.

20.3% (n=35) of the parents had a primary school education, 17.4% (n=30) had a secondary school education, 29.2% (n=50) had a high school education, 26.7% (n=46) had a university education, and 6.4% (n=11) had a postgraduate education (Table 1).

Of the individuals surveyed, 83.9% (n=162) obtained information about antibiotics from a doctor, 9.8% (n=19) from the package leaflet, 5.3% (n=10) from the internet, and 1.0% (n=2) from other means. The most commonly

Table 2. The relationship between the gender of the parent who completed the questionnaire and known antibiotic names

Antibiotic names known to parents	Parent		Total
	Mother	Father	
	n (%)	n (%)	n (%)
Amoxicillin+clavulanic acid	62 (32.0)	16 (18.0)	78 (27.6)
Cephalexin	13 (6.7)	5 (5.6)	18 (6.4)
Penicillin	46 (23.6)	34 (38.2)	80 (28.3)
Amoxicillin	30 (15.5)	13 (14.6)	43 (15.2)
Ampicillin	14 (7.2)	3 (3.4)	17 (6.0)
Ciprofloxacin	10 (5.2)	3 (3.4)	13 (4.6)
Other	4 (2.1)	2 (2.2)	6 (2.1)
Don't know	15 (7.7)	13 (14.6)	28 (9.8)
Total	194 (100.0)	89 (100.0)	283 (100.0)

Fisher's exact test (p=0.047), participants were allowed to select more than one response option.

recognized antibiotics were penicillin (28.3%, n=80), amoxicillin and clavulanic acid (27.6%, n=78), amoxicillin (15.2%, n=43), cefalexin (6.4%, n=18), ampicillin (6.0%, n=17), and ciprofloxacin (4.6%, n=13).

47.9% (n=80) of parents reported using antibiotics once a year, 34.7% (n=58) once every 4–6 months, 10.8% (n=18) once every 2–3 months, and 6.6% (n=16) once a month. 80% (n=136) of parents reported reading the antibiotic package leaflet, 3.5% (n=6) reported not reading it, and 16.5% (n=28) reported sometimes reading it. 95.8% (n=163) of parents reported not making any changes to antibiotic doses or frequency without a doctor's recommendation, 1.8% (n=3) reported sometimes making changes, and 2.4% (n=4) reported making changes. Descriptive evaluation of the items related to the purpose and method of antibiotic use indicated that these questions provided information on parents' reasons for administering antibiotics, the duration and frequency of use, and dose-adjustment practices.

65.7% (n=113) of parents reported that their children had not been administered prophylactic antibiotics before tooth extraction or any other dental treatment; 19.8% (n=34) reported that they had been administered antibiotics; and 14.5% (n=25) were unaware of whether they had been administered antibiotics.

The distribution of recognized antibiotic names exhibited disparities between mothers and fathers ($p<0.05$). The most frequently known antibiotic among mothers was amoxicillin + clavulanic acid (32.0%, n=62), while the most frequently known antibiotic among fathers was penicillin (38.2%, n=34) (Table 2).

A statistically significant relationship was found between parents' educational status and the antibiotic names they knew ($p<0.001$) (Table 3). Examining the antibiotic names known by parents according to their educational status revealed that both cephalexin and ciprofloxacin were recognized by 2.4% (n=1) of primary school graduates and 14.3% (n=7) of postgraduates. The proportion of people who knew these antibiotics increased with higher levels of education. Penicillin emerged as the most common response among primary school graduates (31.0%, n=13), whereas amoxicillin + clavulanic acid was most frequently recognized by secondary school graduates (32.4%, n=11). The "do not know" response was

Table 3. The relationship between the parents' educational status and the names of antibiotics they know

Antibiotic names known to parents	Parents' educational status					Total
	Primary school	Secondary school	High school	Undergraduate	Postgraduate	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Amoxicillin+clavulanic acid	9 (21.4)	11 (32.4)	23 (33.3)	26 (29.2)	9 (18.4)	78 (27.6)
Cephalexin	1 (2.4)	0 (0)	5 (7.2)	5 (5.6)	7 (14.3)	18 (6.4)
Penicillin	13 (31.0)	9 (26.5)	19 (27.6)	29 (32.6)	10 (20.4)	80 (28.3)
Amoxicillin	6 (14.3)	3 (8.8)	10 (14.5)	15 (16.9)	9 (18.4)	43 (152.)
Ampicillin	2(4.8)	2 (5.9)	0 (0)	6 (6.7)	7 (14.3)	17 (6.0)
Ciprofloxacin	1 (2.4)	1 (2.9)	0 (0)	4 (4.5)	7 (14.3)	13 (4.6)
Other	3 (7.1)	0 (0)	3 (4.3)	0 (0)	0 (0)	6 (2.1)
Don't know	7 (16.6)	8 (23.5)	9 (13.1)	4 (4.5)	0 (0)	28 (9.8)
Total	42 (100.0)	34 (100.0)	69 (100.0)	89 (100.0)	49 (100.0)	283 (100.0)

Fisher's exact test (p<0.001), participants were allowed to select more than one response option.

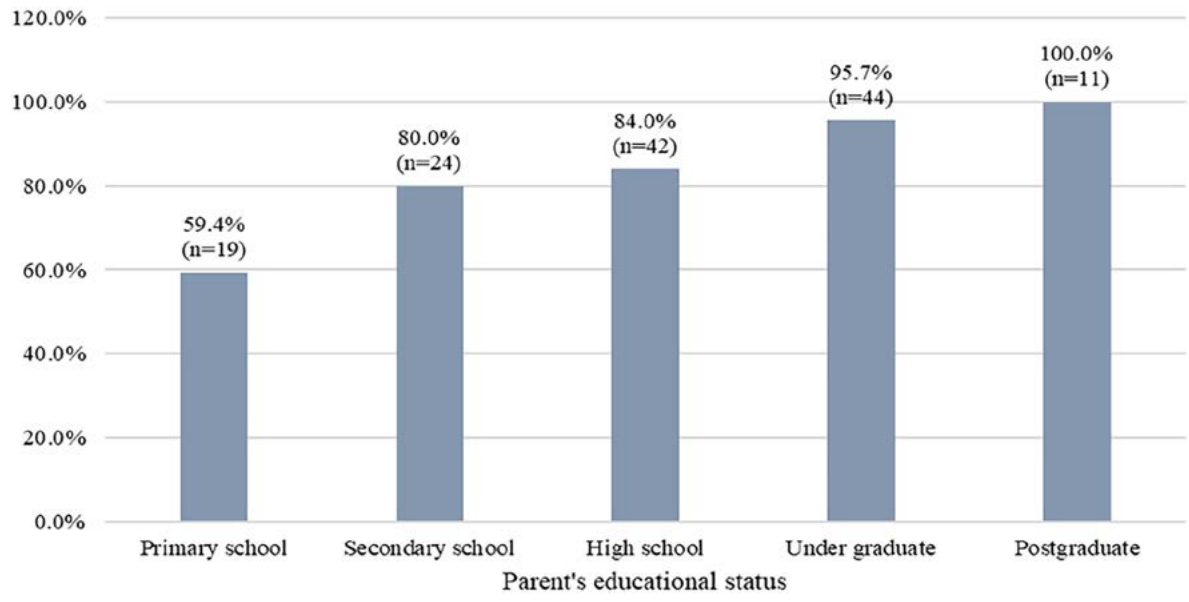

Figure 1. Participants' awareness that inappropriate antibiotic use may result in treatment ineffectiveness (χ^2[df=4, n=169 (3 missing)]=20.203, p<0.001, Cramer's V=0.346).

reported by 16.6% (n=7) of primary school graduates, 4.5% (n=4) of bachelor's degree holders, and none of the postgraduate degree holders.

Awareness that irrational antibiotic use may reduce effectiveness when antibiotics are truly needed increased with education level (p<0.05). Higher education level was associated with greater awareness of the possible consequences of irrational antibiotic use (Fig. 1).

A total of 21 parents (12.4%) reported keeping a supply of antibiotics at home for their children, whereas 149 parents (87.6%) did not. No statistically significant relationship was found between parents' educational status and the proportion of antibiotics kept at home (p>0.05).

Discussion

The most important finding of this study is that parents' knowledge and awareness regarding antibiotic use vary substantially across sociodemographic groups, with gender and educational level emerging as key factors influencing familiarity with commonly used antibiotics. These results highlight the importance of sociodemographic factors in shaping parents' antibiotic-related awareness and decision-making. This study contributes to the relatively limited research on parents of pediatric dentistry patients and provides insight into which parent groups may benefit most from targeted educational interventions. Moreover, by examining unnecessary or inappropriate antibiotic use prior to dental treatment, the study takes a broader perspective on antibiotic use.

The unnecessary and incorrect use of antibiotics poses a serious threat to global health. Ensuring the rational use of antibiotics requires the cooperation of doctors and families alike.[15] Socioeconomic conditions, education levels, and past disease experiences may all have an impact on how parents use antibiotics.[16]

Studies have shown that effective communication between parents and doctors is crucial for the proper use of antibiotics.[17,18] In our study, 83.9% of parents obtained information about antibiotics from their doctor. This result indicates that doctor–parent communication plays a critical role in promoting the correct and rational use of antibiotics, given that the vast majority of parents obtain their knowledge about antibiotics from doctors.

A higher level of education among parents is associated with a greater tendency to correctly identify antibiotics. This situation is consistent with the significantly higher recognition rate of common antibiotics, such as amoxicillin and clavulanic acid, among parents with higher education levels (81.8% among postgraduates, compared to 28.1% among primary school graduates). Similarly, the proportion of "I don't know" responses decreases with increasing education (e.g., 0% among postgraduates), and this relationship is statistically significant (p<0.05). These findings are similarly consistent with those of Mijovic et al.[1] In their study, Mijovic et al.[1] also found that parents with higher levels of education had significantly better knowledge of antibiotics.

A statistically significant relationship was found between the educational status of the parents and the knowledge

that irrational antibiotic use could lead to antibiotic resistance. These findings are consistent with those of Keskin Tunç et al.[19] In our study, the finding of a significant relationship between the education level of the parents and the knowledge that irrational antibiotic use can lead to antibiotic resistance shows that the level of education is an important determinant in increasing health literacy and antimicrobial resistance awareness.

In our study, 65.7% of parents reported that their children were not given preventive antibiotics before tooth extraction or dental treatment, and 14.5% reported not being informed about this. This situation shows that prophylactic antibiotic use is not preferred for routine pediatric dental treatment and is consistent with current guidelines. According to the guidelines of the American Heart Association and the American Academy of Pediatric Dentistry, antibiotic prophylaxis is only indicated for patients at high risk of infective endocarditis, such as immunocompromised individuals, those with certain congenital heart diseases, and those with severe immunodeficiency. It is not recommended for routine dental extractions or treatments in healthy children.[20,21] While the results are positive in terms of preventing unnecessary antibiotic use, the fact that 14.5% of the group lacked knowledge on this subject highlights the importance of informing parents about pre-treatment procedures and the necessity of antibiotics.

According to the findings of our study, 80% of parents reported that they read the antibiotic package insert, and 95.8% stated that they did not make any changes to the dosage or frequency other than those recommended by their physician. These results indicate a high level of awareness regarding antibiotic use and adherence to medical instructions in the community, which may contribute to preventing inappropriate antibiotic use and the development of resistance.

A statistically significant correlation was found between parental gender and known antibiotic names. The most frequently known antibiotic among mothers was amoxicillin + clavulanic acid (60.2%), whereas the most frequently known antibiotic among fathers was penicillin (31.0%). The gender-based difference in antibiotic knowledge may be explained by variations in exposure to commonly prescribed medications. Mothers' greater awareness of amoxicillin and clavulanic acid is probably due to its widespread use in pediatric practice, as mothers tend to accompany children to healthcare appointments more often than fathers. In contrast, fathers' greater familiarity with penicillin may stem from its long-standing and well-known presence as a classic antibiotic, suggesting a broader historical awareness rather than recent exposure through prescriptions. These differences suggest that current prescribing trends and gender-related caregiving roles may both influence parental antibiotic knowledge. In this study, parents' familiarity with commonly used antibiotics was evaluated as an indicator of general awareness and exposure to antibiotic use, consistent with previous research that has used the ability to correctly name antibiotics as a marker of antibiotic-related knowledge and experience.[22]

Some families may keep a supply of antibiotics at home so that they can begin treatment immediately if their children fall ill or experience a toothache. Research carried out in our country has revealed that the rates of keeping spare antibiotics at home vary. In a study conducted in Giresun, 15.4% of parents kept spare antibiotics at home,[23] whereas in a study conducted in Izmir, this rate was 21.5%.[24] In a study conducted among patients applying to primary healthcare institutions in Mersin province, this rate was 6.9%.[25] In another study, this rate was determined to be 4.5%.[10] In our study, we found that 12.4% of parents kept spare antibiotics at home. The rate reported here was lower than that reported in some studies, but higher than that reported in others. However, no statistical difference was found between the educational status of parents who kept spare antibiotics at home and those who did not. Therefore, this difference may stem from factors such as ease of access to regional health services, community awareness levels, socioeconomic conditions and previous experience of illness.

This study has several limitations. First, the results are not generalizable due to the study's single-center nature and relatively small sample size. Furthermore, data collected through parental self-reports via a questionnaire may not accurately reflect actual knowledge and behavior, due to factors such as social desirability bias and recall bias.

In addition, incomplete survey responses and missing data may limit the interpretation of the results. Another limitation of this study is that the findings reflect the sociodemographic characteristics of families attending a single pediatric dentistry center. The clinic primarily serves an urban population with relatively similar educational and socioeconomic backgrounds, which may have influenced parents' levels of antibiotic knowledge, attitudes, and healthcare-seeking behaviors. As these characteristics may differ across rural areas, regions with varying access to health care, or populations with different cultural practices, the results may not be fully generalizable to all parents. Therefore, future studies including more diverse and multi-center samples are needed to enhance external validity.

Another limitation of the study is that the questionnaire used to assess parental knowledge, attitudes, and behaviors regarding antibiotic use was developed specifically for this research. Although content validity was reviewed by experts, the instrument did not undergo statistical validation or reliability testing, which may limit the generalizability of the findings.

Conclusion

This study reveals that parents' knowledge, attitudes, and behaviors regarding antibiotic use are strongly influenced by sociodemographic factors, particularly education level and parental role. While most parents demonstrated appropriate awareness and reported responsible antibiotic practices, gaps in knowledge were observed in specific areas, such as the rationale for prophylactic use and the storage of antibiotics at home. The findings also highlight the critical contribution of physician–parent communication in promoting rational antibiotic use, as healthcare professionals remain the primary source of information. Although routine dental procedures rarely require prophylactic antibiotics in healthy children, a lack of awareness among some parents underscores the need for improved education on indications for use. Taken together, the results indicate that further targeted interventions and health education strategies are necessary to enhance antimicrobial awareness and prevent inappropriate antibiotic use. Future research should include larger, more diverse populations to improve generalizability and ensure a comprehensive understanding of parental knowledge and practices regarding antibiotic use.

Ethics Committee Approval: The Tekirdağ Namik Kemal University Ethics Committee granted approval for this study (date: 31.01.2023, number: 2023.13.01.13).

Informed Consent: Informed consent forms were obtained from all parents.

Conflict of Interest: None declared.

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