The relationship of smokers' parents to the incidence of pneumonia in toddlers in the outpatient installation of PKU Muhammadiyah Bantul General Hospital

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Abstract

The growth and development of toddlers is a crucial phase requiring thorough health monitoring due to their vulnerability to illness. Pneumonia is a prevalent infection that can be triggered by multiple risk factors, including parental smoking. This study aims to determine the relationship between paternal smoking and the occurrence of pneumonia in toddlers. This quantitative research employed a correlational study design and a cross-sectional approach. Sampling was performed utilizing consecutive questionnaires, encompassing 91 smoking parents of toddler patients at PKU Muhammadiyah Bantul General Hospital. The Pearson Chi-Square test was employed for data analysis. Bivariate analysis revealed a significant result ($p = 0.000$) with Cramer's $V = 0.754$, demonstrating a strong positive correlation between parental smoking and pneumonia in toddlers. The prevalence of pneumonia was 1.1% in low smokers (19.2% of respondents), 36.3% in moderate smokers (46.2%), and 34.1% in high smokers (34.1%). The statistical test results indicate the rejection of H_0 and the acceptance of H_a, signifying a statistically significant relationship between parental smoking behavior and the occurrence of pneumonia in toddlers. Parents are urged to enhance their understanding of the effects of smoking on children's health. Future researchers are encouraged to further the investigation with a multidisciplinary methodology and multivariate analysis.

Keywords: parents of smokers; pneumonia in toddlers

1. Introduction

Pneumonia is an acute respiratory infection that can infect one or both lungs. Pneumonia can affect anyone, be it children, young adults or the elderly, but this disease is a concern because the mortality rate of toddlers from this disease is higher than other diseases There is no single cause of pneumonia, pneumonia can be caused by bacteria, viruses, or fungi in the air. Children who get pneumonia will have difficulty and pain to breathe because their lungs are filled with pus and fluid (Dinas Kesehatan Kota Yogyakarta, 2022).

Pneumonia kills more children than any other infectious disease, claiming the lives of more than 700,000 children under the age of 5 each year, or about 2,000 children per day. That number includes about 190,000 newborns. Worldwide, more than 1,400 cases of pneumonia occur per 100,000 children per year, or 1 in every 71 children, with the highest incidence in South Asia (2,500 cases per 100,000 children) and West and Central Africa (1,620 people) (WHO, 2023).

The WHO also states that pneumonia is the highest cause of death for children under five after measles, malaria, and AIDS (Wahl et al., 2020). About 39% of pneumonia cases occur in Southeast Asia and 30% in Africa. Indonesia ranks 8th out of 15 countries in the world in terms of the number of infant and child deaths due to pneumonia, with 278,261 children under five in Indonesia estimated to have contracted pneumonia in 2021. Although this figure decreased by 10.19% compared to the previous year (309,838 cases), the figure is still relatively high (Sumarni, 2023). The prevalence of pneumonia in Indonesia is increasing in all age groups, ranging from 2.1% to 2.7% (Farida et al., 2017). The group of people with pneumonia consisted of patients between the ages of 1 and 4 years, and the number of pneumonia patients began to increase between the ages of 45 and 54. In 2015, pneumonia was the leading cause of child death worldwide, 920,136 children died from pneumonia, 16% of whom were children under 5 years old.

Results of Basic Health Research (Riskesdas) Kementerian Kesehatan RI, (2018), The prevalence of pneumonia based on diagnosis by healthcare workers is 2% and 4% based on diagnosis by healthcare

workers and symptoms. According to the 2022 Health Profile, pneumonia is the largest cause of death in post neonatal (29 days-11 months) at 15.3% and in toddlers aged 12-59 months (12.5%) (Kementerian Kesehatan RI, 2022). Data on the discovery of pneumonia cases in Bantul district in 2018 found 1093 cases, in 2019 there were 941 cases, in 2020 there were 949 cases and in 2021 there were 424 cases of toddlers with pneumonia (BPS, 2022). The impact of Pneumonia in toddlers is very large, pneumonia in toddlers can interfere with the growth and development of toddlers to cause death. Some of the impacts and complications of pneumonia in children include thoracic empyema, purulent pericarditis, pneumothorax, or extrapulmonary infections such as purulent meningitis. Thoracic emphyema is the most common complication that occurs in bacterial pneumonia. Toddlers with pneumonia will have coughing and/or difficulty breathing, with or without fever, pneumonia is diagnosed by the presence of rapid breathing or the lower chest wall being pulled inwards where their chest moves inward or shortens while inhaling. Wheezing is more common in viral infections (WHO, 2022).

WHO and UNICEF integrated the *Global Action Plan for Pneumonia and Diarrhoea* (GAPPD) which aims to accelerate the control of pneumonia with a combination of interventions to protect, prevent and treat pneumonia in children with measures to protect children from pneumonia, including encouraging exclusive breastfeeding and adequate complementary feeding, preventing pneumonia with vaccinations, washing hands with soap, reducing household air pollution, HIV prevention and prophylaxis cotrimoxazole in HIV-infected and exposed children, treating pneumonia with a focus on ensuring that every sick child has access to good services, can get the antibiotics and oxygen they need. Effective diagnosis and treatment of pneumonia is essential to improve the survival of the child. To meet the Sustainable *Development Goal* (SDG) 3.2.1 (reduce child mortality), ending deaths from preventable diarrhea and pneumonia is an urgent priority (WHO, 2022).

The causes of pneumonia are differentiated into internal and external. Internal factors include age, gender, nutritional status, low birth weight (BBLR), vaccination status, and breast milk feeding, while external factors include housing density, air pollution, and type of housing, ventilation, and cigarette smoke (Astini et al., 2020). Families smoking at home has become a worrying problem in Indonesia.

Having a family member in this case a father who smokes in the house can cause family health problems such as respiratory diseases, so it can increase the attack of ISPA, especially in young children. Children whose parents smoke are more susceptible to influenza, asthma, pneumonia, and other respiratory diseases (Astini et al., 2020; Wardani et al., 2016). The prevalence of active smokers in Indonesia continues to increase. Data from the 2023 Indonesian Health Survey (SKI) conducted by the Ministry of Health (Kemenkes) shows that the number of active smokers is estimated to reach 70 million people, with 7.4% of them smokers aged 10-18 years (Kemenkes RI, 2024). The largest increase in the number of smokers occurred in children and adolescents. Based on data *from the Global Youth Tobacco Survey* (GYTS) in 2019, the prevalence of smoking among schoolchildren aged 13 to 15 years increased from 18.3% in 2016 to 19.2% in 2019. Meanwhile, the 2023 SKI data shows that the 15-19 year old age group is the largest group of smokers (56.5%), followed by the 10-14 year old age group (18.4%) (Kemenkes RI, 2024).

The data shows that the young age group has experienced a significant increase in the percentage of smokers. In the age group of 15–19 years, the figure increased from 9.36% in 2022 to 9.84% in 2024. As for the 20-24 year old group, the percentage increased from 25.99% to 27.54% in the same period. This suggests that smoking begins to become a habit from adolescence and continues into early adulthood. The productive age group recorded the highest number of smokers compared to other groups. In the 25–29 year age group, the percentage of smokers is stable at 32.12% in 2023 and 2024. Meanwhile, the 35-39 year old age group recorded the highest figure in 2024 at 35.74%. The consistency of smoking habits at this age reflects a culture that still supports tobacco consumption (Loahandi, 2024).

The results of the Preliminary Study conducted by researchers at PKU Muhammadiyah Hospital Bantul from December 31, 2024 to January 4, 2025, data were obtained that from January to December 2024 there were 12827 patients under five who received treatment at PKU Muhammadiyah Hospital Bantul, with an average of 1069 patients visiting under five patients every month. The results of the preliminary study also found data that in 2024 there will be 822 patients who receive treatment at PKU Muhammadiyah Bantul Hospital, from which there are 237 patients aged 0 to 5 years. From the data, it

was concluded that 34.68% of pneumonia patients who visited PKU Muhammadiyah Bantul Hospital were children aged 0 to 5 years.

2. Methods

This study is a quantitative study, with a correlation study design and this study uses *a cross sectional* approach. This research is a quantitative research with a type of correlational research. According to Creswell, (2018), Quantitative correlational research is research using statistical methods that measure the influence between two or more variables. Correlation is one of the quantitative data analysis techniques, two or more variables are said to be correlated if changes in one variable are followed by changes in the other variable in an orderly manner in the same direction (positive correlation) or opposite (negative correlation) (El Hasbi, 2023).

This study aims to determine the relationship between smokers' parents, in this case fathers and the incidence of pneumonia in toddlers, as well as to analyze the close relationship between toddlers with pneumonia and smokers' parents, in this case smokers' fathers who are treated at the Outpatient Installation of PKU Muhammadiyah Bantul Hospital. This study involved a population of all parents of patients under the age of 6-59 months who received treatment at the Outpatient Installation of PKU Muhammadiyah Hospital Bantul in April 2025. The population in this study was 1069 and to obtain a representative sample, the researcher used the Slovin formula with an error rate of 10%, so that a sample number of 91 respondents was obtained. The sampling technique used is *consecutive sampling*, which is selecting respondents based on inclusion criteria until the required number is met. The inclusion criteria include toddlers who receive exclusive breastfeeding, good nutrition, complete immunization, and do not have congenital diseases. Meanwhile, the exclusion criteria were incomplete patient data, non-treatment visits, or respondents' unpreparedness to participate.

This research was carried out by referring to the principles of research ethics set by the Ethics Committee of RSU PKU Muhammadiyah Bantul. Four main principles of research ethics are applied, namely respecting human dignity and dignity through the provision of informed consent, maintaining the privacy and confidentiality of respondent data, upholding justice and inclusivity without discrimination, and taking into account the benefits and risks for respondents. Researchers ensure that research is carried out professionally, transparently, and responsibly, including by conducting ethical tests and obtaining ethical clearance.

This study uses two types of data, namely primary data and secondary data. Primary data was obtained directly from respondents through the distribution of questionnaires, while secondary data was obtained from patient medical record documents. The main instrument in primary data collection is a closed questionnaire that has been modified from the research questionnaire Wahyu & Sari, (2022), which contains questions related to the characteristics of the respondents and the smoking behavior of parents (fathers). Respondent characteristics included the age and gender of the child, history of breastfeeding, birth history, parental education, and immunization status. Smoking behavior variables were measured through 17 question items covering three aspects: duration (2 questions), frequency (10 questions), and smoking intensity (5 questions), with favorable and unfavorable statements. Scores were given using a 4-point Likert scale, and were categorized into three levels: low (≤16), medium (17–34), and high (≥35) based on the calculation of the ideal mean and standard deviation according to Saifuddin, (2015). Meanwhile, secondary data was obtained from the medical records of patients under five who were treated at PKU Muhammadiyah Hospital Bantul from February to March 2025. The data collected included the patient's name, parental identity, radiology results, and the patient's general condition upon admission, as well as the status of the pneumonia diagnosis. Pneumonia status is categorized binarily: 1 for pneumonia and 2 for non-pneumonia.

The method of data processing and analysis in this study begins with the collection of primary data through questionnaires and secondary data from medical records. After the data is collected, an editing process is carried out to ensure completeness, consistency, and readability of the data, followed by coding to convert qualitative data into quantitative data with a predetermined coding system. The data entry process is carried out by entering the encoded data into the master table, then cleaning is carried out to verify and ensure that there are no input errors.

3. Results and Discussion

3.1. Results

3.1.1. Respondent Characteristics

The characteristics of the respondents in this study are explained in table 1 below:

Table 1. Characteristics of Respondents

Yes	Variable Name Characteristics of respondents	Frequency (f)	Percentage (%)
1	Age		
	6 ≤ 12 months	26	28.6%
	12 ≤ 59 months	65	71.4%
	Total Responden	91	100.0%
2	Gender		
	Woman	38	41.8%
	Man	53	58.2%
	Total Responden	91	100.0%
3	Parent Education		
	SD	2	2,2%
	SMP	9	9,9%
	SMA	52	57,1%
	Bachelor	28	30,8%
	Total	91	100,0%
4	Socioeconomic status		
	Income Under MSEs	15	16.5%
	Income According to MSEs	57	62.6%
	Income Above MSEs	19	20.9%
	Total	91	100.0%

In table 1, the characteristics of toddler respondents in this study consist of 91 respondents aged 6 months to 12 months, as many as 26 (28.6%) toddlers and as many as 65 (71.4%) toddlers aged 12 months to 59 months, 38 (41.8%) girls under five and as many as 53 (58.2%) toddlers are male, all respondents have good nutritional status, get exclusive breastfeeding, get complete immunization, be born with a normal weight and not suffer from congenital diseases or cloth diseases.

The inclusion of smoker parents in this study as many as 91 respondents had an educational history, 2 (2.2%) respondents had an elementary school education, 9 (9.9%) had a junior high school (SMP) education, 52 (57.1%) had a high school education and 28 (30.8%) respondents were bachelor's graduates. Respondents have income below MSEs as many as 15 (16.5%) respondents, income according to MSEs as many as 57 (62.6%) respondents and as many as 19 (20.9%) respondents have income above MSEs.

3.1.2. Data Analysis

3.1.2.1. Behavior of Smokers' Parents

The behavior of smokers' parents who are respondents in this study is explained in table 2 below:

Table 2. Behavior of Smoking Parents

Behavior of Smokers' Parents	Frequency (f)	Percentage (%)
Low	18	19,2%
Keep	42	46.2%
Tall	31	34.1%
Total	91	100.0%

From table 2, 91 respondents were obtained, namely parents of smokers who have light, medium and high categories. In table 2, 18 (19.2%) respondents were found in the low category, 42 (46.2%) respondents in the medium category and 28 (34.1%) respondents in the high category.

3.1.2.2. Incidence of Toddlers with Pneumonia

Toddlers who were respondents in this study based on medical diagnosis are described in table 3 below:

Table 3. Pneumonia in Toddlers

Event Pneumonia	Frequency (f)	Percentage (%)
Pneumonia	65	71.4%
No Pneumonia	26	28.6%
Total	91	100.0%

In table 3, as many as 91 toddlers who were research respondents were found, there were 71.4% of toddlers diagnosed with pneumonia and as many as 28.6% were not diagnosed with pneumonia. Diagnosis in toddlers is obtained from secondary data in the form of patient medical record data.

3.1.2.3. The Relationship of Smoking Parents' Behavior with the Incidence of Pneumonia in Toddlers

The distribution of parents of smokers by category and incidence of toddlers with pneumonia is described in table 4 below:

Table 4 Relationship between Smoking Parents' Behavior and the Incidence of Pneumonia in Toddlers

		Pneumonia in Toddlers							
		Pneumonia	**%**	**No Pneumonia**	**%**	**Total**	**Total %**	***P value Pearson Chi-Square***	***Cramer's V***
Categories of Smoking Parents	Low	1	1	17	18	18	19	0,000	0,754
	Keep	33	36	9	9	42	46		
	Tall	31	34	0	0	31	34		
Total		65	71	26	28	91	100		

In table 4, it is explained that for parents with low category (18 parents), 1 toddler had pneumonia and 17 toddlers did not have pneumonia. So the incidence of pneumonia in toddlers is 1.098% for parents of smokers in the low category. In parents of smokers with the moderate category (42 parents), 33 toddlers had pneumonia and 9 toddlers did not have pneumonia, so that the incidence of pneumonia between toddlers and parents of smokers in the moderate category was 36.26%. Meanwhile, in parents of smokers in the high category (31 parents), the results were obtained that all (31) toddlers had pneumonia. So that the incidence of pneumonia for toddlers in parents of smokers with a high category is 34.065%.

In table 4, it can also be explained that in the Pearson Chi-Square statistical test, the result was p = 0.000, with a significance value of < 0.05, meaning that there is a statistically significant relationship between the category of smoking parents and the incidence of pneumonia in toddlers. In the results of statistical calculation, it was also found that the value of Cramer's V = 0.754 which can be interpreted as having a very strong relationship between the level of parental smoking habit or behavior and the incidence of pneumonia in toddlers, the distribution of data shows that the higher the level of parental smoking habit or behavior, the higher the incidence of toddlers experiencing pneumonia. Thus, the direction of the relationship between the two variables is substantively positive, which means that an increase in parents' smoking habits or behaviors is related to an increased risk of pneumonia in children under five. This correlation is strong and statistically supported (p < 0.001).

Based on the results of the statistical test carried out, it can be concluded that Ha is proven, that is, there is a statistically significant relationship in a positive direction between the habits or behavior of smoking parents and the incidence of pneumonia in toddlers with a value of p = 0.000 based on the results of the Pearson Chi-Square statistical test with Cramer's value V = 0.754.

3.2. Discussion

3.2.1. Behavior of Smokers' Parents

Based on the results of data collection and data analysis, it was found that the number of samples was 91 respondents, namely parents of smokers who had light, medium and high categories. In table

4.2, 19.2% of respondents were in the low category, 46.2% of respondents in the medium category and 34.1% of respondents in the high category.

This study also examines the relationship between the category of parents' smoking habits and the incidence of pneumonia in toddlers. Smoking habits are classified into three categories: low, medium and high. The results of the analysis showed that the higher the category of parental smoking habits, the higher the incidence of pneumonia in toddlers. In the low category, only 1.098% of toddlers experienced pneumonia, in the medium category, the pneumonia rate jumped to 36.26% and in the high category, all toddlers experienced pneumonia. The findings of this study show a very significant relationship between exposure to cigarette smoke from the behavior of smokers' parents, in this case fathers, and the incidence of pneumonia in toddlers. Toddlers with parents who are active smokers are at high risk of developing pneumonia.

This study proves that the high rate of smoking in parents results in a high incidence of pneumonia in toddlers due to exposure to cigarette smoke is the main cause of a number of adverse health effects in children, including asthma, cough, phlegm, wheezing, shortness of breath, lower respiratory diseases, lung function, middle ear disease, nasal irritation, and other respiratory diseases.

This research corroborates the results of research conducted by Stefani & Setiawan, (2021), which states that there is a meaningful relationship between parents' smoking behavior at home and the risk of severe pneumonia. Smoking behavior in the home reflects exposure to secondhand and *thirdhand smoke.* Research by Kusumawardani et al., (2020) found that there was a significant association between smoking habits in the home and the incidence of pneumonia in toddlers. Children who are exposed to second-hand smoke from fathers or other family members have a twice the risk of developing pneumonia compared to those who are not exposed.

3.2.2. Toddlers With Pneumonia

Based on the results of data collection and data analysis, it was found that the number of samples of 91 respondents as many as 91 toddlers who were respondents to the study, there were 71.43% of toddlers diagnosed with pneumonia and as many as 28.57% were not diagnosed with pneumonia. This study proves that toddlers are very vulnerable to exposure to cigarette smoke because their respiratory and immune systems are not fully developed. Passive smokers, especially toddlers who live with smokers' parents, can be exposed to harmful substances such as carbon monoxide, nicotine, and fine particles that irritate the airways. This causes inflammation and increases the risk of lung infections such as pneumonia and other respiratory diseases.

The results of this study are in line with the results of research conducted by Kristya et al., (2023) which states that the description of the characteristics of toddlers who experience pneumonia who are hospitalized at Surya Husadha Hospital is mostly included in the age group of 1-23 months (< 2 years) as many as 42 patients (51.9%), male as many as 48 patients (59.3%), as many as 69 patients (85.2%) have good nutritional status and all toddlers have received complete basic immunization as many as 81 patients (100%). According to the severity of the disease, most of the children under five had non-severe pneumonia in 73 patients (90.1%) with an average length of hospitalization of 5 days.

In line with the results of the research conducted by Setiawan, (2024) who explained the results of his findings, namely data that met the inclusion criteria amounted to 50 people, most of which were in boys (66%), especially in the age group of <1 year (58%). The most common comorbidities with pneumonia were anemia (30%), and all patients (100%) used antibiotics during treatment. In laboratory examinations, leukocyte levels were found within normal limits (52%) and radiological images in the form of infiltrates (50%). From the results of this study, it can be concluded that cases of pneumonia in children under five most often occur in boys with the age of <1 year.

A study conducted at Dr. Zainoel Abidin Hospital, Padang by Nurjannah et al., (2016) explained that there were 144 children with pneumonia, consisting of 86 (59.7%) boys and 58 (40.3%) girls with an average age of 15 months. The most cases occurred in the age group of 2 – 11 months (58.3%), with good nutrition at 49.3%. Based on the clinical picture, cough is the most common clinical symptom found at 94.4%, followed by nasal lobe breathing 93.1%, and ronki 92.4%, then fever with an average temperature of 380 C, tachycardia with an average respiratory rate of 60 times/minute, tachycardia with an average pulse rate of 147 times/minute. Other data were in the form of retraction of the muscles of the chest wall, wheezing, runny nose, vomiting, diarrhea, seizures and cyanosis. The length of illness

before the child was admitted to the hospital was the most after day 3, which was 58.3%, followed by the 5th sick day and less than 2 days, with an average length of hospitalization of 8 days.

3.2.3. The Relationship between Smoking Parents (Fathers) and the Incidence of Pneumonia in Toddlers

Based on the results of data collection and data analysis, it was found that the number of samples of 91 respondents as many as 91 toddlers who were respondents to the study, there were 71.43% of toddlers diagnosed with pneumonia and as many as 28.57% were not diagnosed with pneumonia. This study proves that toddlers are very vulnerable to exposure to cigarette smoke because their respiratory and immune systems are not fully developed. Passive smokers, especially toddlers who live with smokers' parents, can be exposed to harmful substances such as carbon monoxide, nicotine, and fine particles that irritate the airways. This causes inflammation and increases the risk of lung infections such as pneumonia and other respiratory diseases.

The results of this study are in line with the results of the research conducted oleh Kristya et al., (2023) which states that the description of the characteristics of toddlers who experience pneumonia who are hospitalized at Surya Husadha Hospital is mostly included in the age group of 1-23 months (< 2 years) as many as 42 patients (51.9%), male as many as 48 patients (59.3%), as many as 69 patients (85.2%) have good nutritional status and all toddlers have received complete basic immunization as many as 81 patients (100%). According to the severity of the disease, most of the toddlers suffered from mild pneumonia as many as 73 patients (90.1%) with an average length of hospitalization of 5 days.

In line with the results of the research conducted by Setiawan, (2024) who explained the results of his findings, namely data that met the inclusion criteria amounted to 50 people, most of which were in boys (66%), especially in the age group of <1 year (58%). The most common comorbidities with pneumonia were anemia (30%), and all patients (100%) used antibiotics during treatment. In laboratory examinations, leukocyte levels were found within normal limits (52%) and radiological images in the form of infiltrates (50%). From the results of this study, it can be concluded that cases of pneumonia in children under five most often occur in boys with the age of <1 year.

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4. Conclusion

The conclusion obtained from the results of the study entitled The Relationship between Smoking Parents and the Incidence of Pneumonia in Toddlers in the Outpatient Installation of PKU Muhammadiyah Hospital Bantul found that as many as 91 toddlers who became research respondents, there were as many as 71.43% of toddlers diagnosed with pneumonia and as many as 28.57% were not diagnosed with pneumonia. Based on the results of data collection and data analysis, it was found that as many as 91 respondents were parents of smokers who had light, medium and high categories. Based on data analysis, 19.2% of respondents were in the low category, 46.2% of respondents in the medium category and 34.1% of respondents in the high category.

In this study, data was found that for parents in the low category (18 parents), 1 toddler had pneumonia and 17 toddlers did not have pneumonia. So the pneumonia ratio is 1.098% for parents of low-category smokers. In parents of smokers in the moderate category (42 parents), 33 toddlers had pneumonia and 9 toddlers did not have pneumonia, so that the ratio of pneumonia between toddlers and parents of smokers in the moderate category was 36.26%. Meanwhile, in parents of smokers in the high category (31 parents), the results were obtained that all (31) toddlers had pneumonia. So the ratio of pneumonia of toddlers to parents of smokers with a high category is 34.065%. Based on the results of

the statistical test carried out, it can be concluded that there is a statistically significant relationship in a positive direction between the habits or behavior of smoking parents and the incidence of pneumonia in toddlers with a value of p = 0.000 based on the results of *the Pearson Chi-Square* statistical test with *a value of Cramer's V* = 0.754.

5. Limitations on Research

Data collection in this study was carried out directly using questionnaires distributed to parents of pediatric patients in the Outpatient Facility. However, this method has some constraints. One of the limitations is that questionnaires require the respondents' memory, so the answers given may not fully reflect the actual conditions. In addition, some respondents were not willing to provide a paraphrasing, signature, or phone number even though they were willing to fill out the questionnaire. Some respondents also refused to be photographed, which was originally planned as part of the research documentation. These constraints can affect the completeness of the data and the validity of the responses obtained.

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