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Complications Among Hospitalized Pediatric Patients with Measles at Rumah Sakit Hj. Bunda Halimah, Batam, Indonesia, November 2025

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Abstrak

Latar Belakang: Campak merupakan penyakit infeksi yang masih menjadi masalah besar di Indonesia. Hingga pertengahan tahun 2025, lebih dari 46 kejadian luar biasa (KLB) campak dilaporkan di Indonesia. Terjadi lonjakan kasus rawat inap penderita campak pada anak dari 11 kasus pada Oktober 2025 menjadi 28 kasus pada November 2025 di Rumah Sakit Hj. Bunda Halimah, Batam. Laporan KLB secara global melaporkan komplikasi campak, antara lain pneumonia dan dehidrasi yang dapat menyebabkan pasien harus dirawat inap. Penelitian ini bertujuan untuk mengidentifikasi komplikasi yang paling banyak ditemukan pada pasien anak dengan campak di Rumah Sakit Hj. Bunda Halimah, Batam, November 2025. Metode: Penelitian ini merupakan studi *cross-sectional* retrospektif pada seluruh pasien anak berusia <18 tahun dengan diagnosis klinis campak yang dirawat di Rumah Sakit Hj. Bunda Halimah, Batam, pada November 2025. Pengambilan sampel dilakukan dengan total sampling. Statistik deskriptif dianalisis menggunakan Microsoft Excel 2016. Hasil: Sebanyak 28 pasien anak dengan campak dirawat inap. Rerata usia pasien adalah 4 tahun 9 bulan. Kelompok usia terbanyak adalah anak usia 4 tahun 9 bulan. Kelompok usia terbanyak adalah usia 1 hingga <7 tahun (64,3%). Demam dan ruam ditemukan pada seluruh pasien (100,0%), diikuti batuk (96,4%) dan penurunan asupan makanan (60,7%). Kelainan laboratorium yang ditemukan meliputi leukopenia (42,9%), trombositopenia (3,6%), dan hiponatremia (21,4%). Lima belas pasien (53,6%) mengalami bronkopneumonia dan 13 pasien (46,4%) mengalami dehidrasi. Kesimpulan: Bronkopneumnoia dan dehidrasi merupakan dua komplikasi yang paling banyak ditemukan pada pasien anak yang dirawat inap dengan campak di Rumah Sakit Hj. Bunda Halimah, Batam.

Kata kunci: Anak, Campak, Komplikasi, Bronkopneumonia, Dehidrasi

Abstract

Background: Measles is an infectious disease that remains a major concern in Indonesia. By mid-2025, more than 46 cases of measles outbreak had been reported in the country. Locally, at Rumah Sakit Hj. Bunda Halimah, Batam, the number of hospitalized pediatric patients with measles rose from 11 in October 2025 to 28 in November 2025. Outbreak reports globally reported complications of measles including pneumonia and dehydration. These complications can lead to hospitalization. This study aimed to identify the most prevalent complications among pediatric patients with measles at Rumah Sakit Hj. Bunda Halimah, Batam, in November 2025 Method: This was a retrospective cross-sectional study on all pediatric patients aged <18 years old with a clinical diagnosis of measles hospitalized at Rumah Sakit Hj. Bunda Halimah, Batam, in November 2025. Total sampling was used in this study. Descriptive statistics was performed by Microsoft Excel 2016. Results: A total of 28 pediatric patients with measles were hospitalized. The mean age was 4 years and 9 months. The most

prevalent age group was children aged 1 to <7 years old (64.3%). Fever and rash were present in all patients (100.0%), followed by cough (96.4%), and reduced oral intake (60.7%). Laboratory abnormalities observed include leukopenia (42.9%), thrombocytopenia (3.6%) and hyponatremia (21.4%). Fifteen patients (53.6%) had bronchopneumonia and 13 (46.4%) patients had dehydration. Conclusion: Bronchopneumonia and dehydration were the two most prevalent complications among pediatric patients hospitalized with measles at Rumah Sakit Hj. Bunda Halimah, Batam.

Keywords : Pediatric, Measles, Complications, Bronchopneumonia, Dehydration

BACKGROUND

Measles, caused by the measles virus, is one of the most contagious infectious diseases in humans. It spreads through airborne respiratory droplets or by direct contact with infected secretions. Measles can be prevented and eliminated by vaccination, and increasing vaccination coverage aims to achieve the high population immunity required to interrupt transmission. The herd immunity threshold for measles varies across settings, ranging from 89% to 93% (WHO, 2017).

Globally, the COVID-19 pandemic disrupted immunization strategies resulting in significant decline of surveillance performances and vaccination coverage (Togola et al., 2026). Similar disruptions were observed in Indonesia, where the coverage of the first dose of measles containing vaccine (MCV1) declined from 88% in 2019 to 72% in 2021, and coverage of the second dose of measles vaccine (MCV2) declined from 71% to 50% over the same period. These disruptions widened existing immunity gaps that led to a substantial increase of measles and rubella cases in 2022 (Chacko et al., 2023). National survey data also indicated suboptimal measles vaccination coverage among Indonesian children. The 2018 Basic Health Research (*Riset Kesehatan Dasar, Riskesdas)* reported that 77.3% of children aged 12-23 months had received measles vaccination, compared with 64.8% in the 2023 Indonesian Health Survey (*Survei Kesehatan Indonesia,* SKI) (Kementrian Kesehatan Republik Indonesia, 2018, 2023). This coverage remains below the recommended level of herd immunity threshold allowing transmission of the measles virus to persist (Nelwan, 2026).

Measles is a leading cause of morbidity and mortality in children due to its high transmissibility and potential for severe complications (Hermawan et al., 2025). An outbreak report in the Philippines found pneumonia in 67.7% of hospitalized patients, and patients with measles complicated with pneumonia were 2.29 times more likely to die (OR: 2.29 CI 1.55 – 3.38) (Domai et al., 2021). A study in Rabat reported complications in 56% of hospitalized patients, consisting of respiratory (54.0%) and digestive (32.0%) complications. Interestingly, children who were not fully vaccinated were more likely to develop complications than fully vaccinated children ($p<0.001$) (Abassi et al., 2026). A study in Jordan also reported frequent respiratory complications (68.3%) consisting of bronchopneumonia (81.4%) and pneumonia (18.6%) (Alsulaiman et al., 2025). Therefore, understanding the complications most frequently observed in patients hospitalized with measles is important for characterizing clinical burden of measles and guiding early patient management.

According to the Ministry of Health of Indonesia, more than 46 cases of measles outbreak had been reported up to mid-2025 (Kementrian Kesehatan Republik Indonesia, 2025). This raises concern about the situation in Batam, an island city in Indonesia. Data on hospitalized pediatric patients in Batam remain limited. The number of pediatric patients hospitalized with measles at Rumah Sakit Hj. Bunda Halimah, Batam, increased from 11 patients in October to 28 patients in November 2025 based on medical records. This prompted the need to characterize the clinical characteristics and the most frequently observed complication among hospitalized pediatric patients with measles at Rumah Sakit Hj. Bunda Halimah, Batam, in November 2025.

METHOD

This was a retrospective cross-sectional study conducted at Rumah Sakit Hj. Bunda Halimah, Batam, in November 2025. Total sampling was used to include all patients aged <18 years old admitted to the pediatric ward with a clinical diagnosis of measles made by a pediatrician. Patients who were discharged upon request were excluded.

Data were collected retrospectively from patients' medical records. The variables collected were demographic characteristics (age and sex), measles vaccination status, presenting symptoms, initial laboratory results taken at admission, and complications at admission. Vaccination status was based on medical records, and patients with no documented history of measles vaccination, were categorized as having no history of measles vaccination. Leukopenia was defined as a leukocyte count <4,000/µL, thrombocytopenia as a platelet count of <150,000/µL, and hyponatremia as a sodium concentration <135 mmol/L. Bronchopneumonia was confirmed by X-ray and interpreted by radiologists and dehydration was diagnosed clinically.

Data were analyzed descriptively using Microsoft Excel 2016. Categorical variables were presented as frequencies percentages, and continuous variables as mean. Patient confidentiality was maintained throughout the data collection and analysis process, and data was used solely for research purposes only.

RESULT AND DISCUSSION

A total of 28 pediatric patients with measles were hospitalized at Rumah Sakit Hj. Bunda Halimah, Batam, in November 2025. Most were male (57.1%). The mean age was 4 years and 9 months old, and the youngest patient was 5 months old. Most patients were 1 to <7 years old (64.3%). Most patients had no recorded history of measles vaccination at admission (89.3%). Details of patient demographics and vaccination status are presented in Table 1.

Table 1. Study demographics and Vaccination Status of Pediatric Patients with Measles

Patient Demography	n	Percentage (%)
Gender		
Female	16	57.1
Male	12	42.9
Age Group		
< 1 years old	2	7.2
1 – <7 years old	18	64.3
≥ 7 years old	8	28.5
Vaccination Status		
Yes	3	10.7
No	25	89.3

Our study was dominated by children aged 1 to <7 years old (64.3%), and 89.3% had no history of recorded measles vaccination. Most children in this age group would be expected to have received at least one dose according to the recommended immunization schedule. In Indonesia, measles vaccination is administered as measles-rubella (MR) or measles-mumps-rubella (MMR) vaccine. The first dose of MR vaccine is administered at 9 months of age, followed by a second dose of MR or MMR at 15-18 months. A third dose of MR or MMR is recommended at 5-7 years of age or through the school-age immunization program for first-grade elementary school students (Kaswandani et al., 2025). The high proportion of patients without a vaccination history is concerning since the absence of vaccination increases the risk of measles infection and its complications. This is consistent with a study in the Philippines, where 84.5% of patients had received no measles-containing vaccine (aOR 1.86, 95% CI 1.04-3.33) and having pneumonia (aOR 2.4, 95% CI 1.56-3.69) were independently associated with

higher odds of mortality (Domai et al., 2021). These findings underscore the importance of ensuring timely and complete immunization to prevent measles infection, its complications, and death.

In our study, fever and rash were the most common presenting symptoms, both occurring in all patients (100%), followed by cough (96.4%). Initial laboratory assessment showed leukopenia in 42.9% of patients followed by hyponatremia (21.4%). The most common complications were bronchopneumonia (53.6%) and dehydration (46.4%). Further details on presenting symptoms, laboratory findings, and complications are presented in Table 2.

Table 2. Presenting symptoms, laboratory results, and complications of Pediatric Patients with Measles

	N	Percentage (%)
Presenting Symptoms		
Fever	28	100.0
Cough	27	96.4
Rash	28	100.0
Conjunctivitis	7	25.0
Koplik Spots	2	7.1
Nausea & Vomiting	12	42.9
Reduced Oral Intake	17	60.7
Laboratory Results		
Leukopenia	12	42.9
Thrombocytopenia	1	3.6
Hyponatremia	6	21.4
Complications		
Bronchopneumonia	15	53.6
Dehydration	13	46.4
Outcome		
Discharged	28	100.0
Deceased	0	0.0

The presenting symptoms in our patients match the typical picture of measles, which includes fever, conjunctivitis, cough, coryza, Koplik spots, and a maculopapular rash (CDC, 2025). Our findings are consistent with a study in Pakistan, which reported fere (98%), rash (98%), and cough (94.6%) as the most prevalent symptoms (Kulsoom et al., 2023). A study in Indonesia likewise found fever and maculopapular rash in all patients, followed by hyperpirpigmented rash (89%). That study also noted that cough was more common in children oler than 1 year than in those under 1 year (90.5% vs 84.2%) (Husada et al., 2020).

Three laboratory abnormalities were observed in our patients: leukopenia (42.9%), thrombocytopenia (3.6%), and hyponatremia (21.4%). We defined leukopenia as a leukocyte count <4,000/µL, thrombocytopenia as a platelet count of <150,000/µL, and hyponatremia as a sodium concentration <135 mmol/L. Our proportion of leukopenia was higher than in a study in Turkey, which reported leukopenia and thrombocytopenia in 12.1% and 6.1% of patients, respectively (Us et al., 2023). This difference may be explained by the difference in timing of blood sampling. Lymphocyte depletion is most pronounced early in measles and recovers quickly (Ryon et al., 2002), so blood taken earlier is more likely to show leukopenia. Additionally, the study in Turkey also found that leukopenia was more common in laboratory-confirmed than in non-laboratory confirmed cases ($p<0.01$), and in unvaccinated patients (26.7%). A possible explanation for this is the loss of lymphocytes and transient immunosuppression that occurs during measles infection (Us et al., 2023). For thrombocytopenia, a tertiary hospital in Athens reported it in only 2 patients (0.58%), with children older than 3 years more likely to be affected ($p<0.05$) (Gianniki et al., 2021). The same

study reported mild hyponatremia in 26% of patients, which is close to our study (Gianniki et al., 2021).

Bronchopneumonia, confirmed by chest X-ray and read by our radiologists, was the most common complication in our study (53.6%). This is comparable to a single-center study in Morocco, where 54% of patients had respiratory complications, dominated by pneumonia (Abassi et al., 2026). A study in Northern Jordan also found respiratory complications to be the most frequent (68.3%) followed by dehydration (34.9%) (Alsulaiman et al., 2025).

Pneumonia is an acute complication of measles and one of the leading causes of measles-related mortality among young children, affecting approximately one in every 20 children with measles (Cherry, 2024). In Greece, children aged 3 years or younger were more likely to have respiratory involvement ($p<0.001$) (Gianniki et al., 2021). Several mechanisms may explain this. The measles virus can evade pro-inflammatory cytokines, block downstream pathways, and deplete B- and T-cell lymphocytes, which suppresses immunity and increases susceptibility to secondary infection (Au et al., 2026). The virus is also acquired by inhaling respiratory droplets that targets the epithelial cells of the upper respiratory tract, which can cause direct lung damage (Mourhri et al., 2025). Together, these mechanisms may account for the high proportion of bronchopneumonia in our patients, although we did not investigate its specific etiology. This highlights the importance of early recognition and appropriate management of respiratory complications in pediatric patients with measles.

Dehydration was the second most common complication (46.4%). This fits with the high proportion of patients who had reduced oral intake (60.7%), and nausea and vomiting (42.9%), on top of fever in all patients (100%). Vomiting causes the loss of electrolytes (Na,K,Cl), and fever increases insensible water loss by more than 10% for every one-degree Celsius rise in body temperature. Febrile children also tends to drink less and sweat more, which worsens fluid and electrolyte loss (Ghosh et al., 2023). When intake cannot keep up with these losses, dehydration follows. A tertiary care hospital in Pakistan reported similar gastrointestinal symptoms, including diarrhea (39.5%), vomiting (30.8%), and poor feeding (64.8%) (Kulsoom et al., 2023). The Greek study also found that dehydration was more common in children older than 3 years old ($p<0.05$) (Gianniki et al., 2021).

Despite patients presenting with complications of measles that requires hospitalization, all patients were discharged in a stable condition, with no PICU/ICU admissions or death during hospitalization. This study has several limitations. The small sample size, short study period, and single-center setting limit the generalizability of our results. Measles was diagnosed clinically without laboratory confirmation, which may have caused misclassification. Finally, because of the retrospective design, we had no information on patients' clinical course after discharge, including readmissions or long-term complications.

CONCLUSION

Bronchopneumonia and dehydration were the most frequently observed complications among hospitalized pediatric patients with measles at Rumah Sakit Hj. Bunda Halimah, Batam. These findings provide a clinical profile of measles complications for our hospital and highlights the importance of careful assessment for respiratory complications and dehydration in children presenting with measles in the emergency department.

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