MedCrave
Step into the World of Research

Journal of Pediatrics & Neonatal Care

Case study

Open Access

CrossMark

Acute bacterial community-acquired pneumonia in children aged 1 month to 15 years in the pediatrics department of Gabriel Toure Teaching hospital

Summary

Introduction: Acute pneumonia is defined as inflammation of the alveoli and interstitial lung tissue, with respiratory signs and symptoms.[1] The term community-acquired pneumonia is used when it develops outside the hospital setting. The aim of our study was to investigate acute community-acquired pneumonia in children aged 1 month to 15 years in the Gabriel Touré teaching hospital pediatric ward.

Patients and methods : This was a prospective descriptive and analytical study conducted from April 1, 2022 to March 31, 2023, including all children aged 1 month to 15 years hospitalized for acute bacterial community-acquired pneumonia.

Results: We collected 211 patients out of a total of 6639 hospitalizations, or a frequency of 3.17%. The age range from 1 month to 12 months was the most represented (58.3%), the mean age was 18.08± 22.7 months with extremes of 1 and 180 months; the equal sex ratio was 1.13. Fathers were blue-collar workers in 33% of cases, and had unfavorable socioeconomic conditions in 62.6%. Respiratory distress was the most frequent reason for consultation (53.1%). Vaccination was correct in 78% of patients. Most patients (49.3%) consulted within the first week of onset of symptoms. Cough (47.9%) and dyspnoea (30.8%) were the main functional signs. The main signs of respiratory struggle were chest indrawing (43.8%) and nasal flaring (23.1%). Crackling rales (45.13%) were the most common physical sign, while severe acute malnutrition accounted for 27.5%. Hyperleukocytosis, predominantly neutrophilic, was found in 60.8% of patients, anemia in 92% and elevated CRP in 64.9%. HIV serology was positive in 7.1% of patients, and Acid-fast bacilli test were positive in sputum in 3.8%. Chest X-rays showed opacity in both lung fields in 28.4% of patients. Pneumonia was the main diagnosis (87.7%). Malnutrition (34.1%) and cardiac malformation (16.6%) were the pathologies most frequently associated with pneumonia. The antibiotic combination amoxicillin + clavulanic acid was the most widely used (82.9%). Hospitalization lasted from 4 to 9 days in 48.34% of cases. Pleurisy was the most frequent complication (4.74%). The mortality rate was high (18.4%), more than half of which occurred between 1 and 12 months of age (53.8%).

Conclusion: Community-acquired pneumonia is common in the pediatric ward of Gabriel Toure teaching hospital. Despite the introduction of pneumococcal vaccine in routine vaccination.

Keywords: Gabreiel Toure teaching hospital, pneumonia, bacteria, child

Volume 15 Issue 1 - 2025

Konaré H,[1] Sacko K,[1] Togo P,[1] Konaté D,[1] Doumbia AK,[1] Dembélé A,[1] Coulibaly O,[1] Traoré BK,[1] Cissé ME,[1] Traoré F,[1] Maïga B,[1] Ahamadou [1,1] Sidibé LN,[1] Touré A,[1] Coulibaly YA,[1] Maïga L,[1] Doumbia A,[1] Traoré K,[1] Ouattara A,[1] Sagara S,[1] Traoré B,[1] Diakité AA,[1] Traoré FD,[1] Sylla M,[1] Togo B[1]

[1]Department of Pediatrics, Gabriel Toure teaching hospital, Mali

Correspondence: Dr. Hawa Konaré, Pediatric researcher at Gabriel Toure teaching hospital, Bamako, Mali, Tel (00223) 76 23 03 43

Received: January 23, 2025 | **Published:** March 11, 2025

Introduction

Acute pneumonia is defined as inflammation of the alveoli and interstitial lung tissue, with respiratory signs and symptoms.[1] The term acute community-acquired pneumonia (CAP) is used when it is acquired in an out-of-hospital setting or develops during the first 48 hours of hospitalization.[2] Pneumonia should be suspected in any child presenting with a febrile condition, associated with tachypnea and/or chest indrawing.[3] Purulent pleurisy is the main complication of acute community-acquired pneumonia in children: 28% according to the Byington study.[4] Pneumonia is the leading cause of death in children (< 5 years) worldwide, beyond the neonatal period. In 2019, 740,180 children under the age of 5 died from pneumonia, representing 14% of all deaths in this age group.[5] This rate rises to 28% if we include the neonatal period from 4 weeks after birth, i.e. almost a third of all deaths.[6] It affects children throughout the world, but is most prevalent in South Asia and sub-Saharan Africa, where it is responsible for 21% of deaths.[5,6] This rate can reach 80% in populations with a high prevalence of malnutrition and low birth weight.[5] Viral causes predominate at all ages. The leading bacterial pathogen in children under 2 is pneumococcus, followed by staphylococcus and streptococcus pyogenes.[7,5] In Mali in 2018, according to the sixth Demographic and Health Survey, 2% of children under 5 years of age presented symptoms of lower respiratory infection dominated by pneumonia at the time of the survey.[8] The aim of this work is to study acute community-acquired pneumonia in children aged 1 month to 15 years in the Gabriel Toure teaching hospital pediatrics department.

Materials and methods

Study site

Our study was carried out in the pediatrics department of Gabriel TOURE teaching hospital, a third referral hospital located in commune III of the District of Bamako, in the city center, and therefore easily accessible to the majority of the population. The pediatrics department is a national reference in the management of childhood illnesses in Mali, and all health centers refer serious cases to it.

Type of study

This is a prospective descriptive and analytical study conducted from April 1, 2022 to March 31, 2023, including all children aged 1 month to 15 years hospitalized for acute bacterial community-acquired pneumonia.

Study population

All children aged 1 month to 15 years hospitalized for acute community-acquired pneumonia were included.

Data collection, analysis and interpretation

Data collected on a survey form were entered into Word and Excel 2016, then analyzed using SPSS version 25 software. The Chi2 test had been used to compare our significant results for a probability P < 0, 05.

Ethical aspects

All patients were included after obtaining informed consent from parents. Inclusion was anonymous. Good medical practice was observed.

Results

Frequency

From April 1, 2022 to March 31, 2023, we collected 211 children presenting with acute community-acquired pneumonia out of 6639 hospitalized patients, representing a hospital frequency of 3.17%.

Socio-demographic characteristics

The age range from 1 month to 12 months was the most represented (58.3%), with an average of 18.08± 22.7 months (Table 1) and extremes of 1 and 180 months. The sex ratio was 1.13. The fathers were predominantly blue-collar workers (33.3%) and the mothers housewives (75.8%), with low socio-economic status (62.6%).

Table 1 Sociodemographic characteristics

Characteristics	Number	Percentage
Age (months)		
12-Jan	123	58,3
13-59	78	37
60-119	8	3,8
120-180	2	0,9
Gender		
Male	112	53,1
Female	99	46,9
Socio-economic conditions		
Favorable	79	37,4
Unfavorable	132	62,6
Vaccination		
Correct	165	78
Incorrect	27	13
Not vaccinated	19	9

Clinical features

49.3% of our patients consulted us within the first week of onset of symptoms. Respiratory distress was the most common reason for consultation (53.1%), followed by cough (22.7%). Vaccination was correct in 78% of our patients. Cough accounted for almost half the functional signs (47.9%), followed by dyspnea (30.8%). Physical signs on entry were dominated by crackling rales (45.1%) and signs of respiratory struggle (28.8%), marked by sub-costal indrawing (43.8) and nasal flaring (23.1%). Malnutrition was present in 42.7% of the children, including 27.5% in the severe form. Pneumonia was associated with severe acute malnutrition in 27.5% of our patients (Table 2). The antibiotic combination amoxicillin + clavulanic acid was used in 82.9%. Patients were hospitalized for 4 to 9 days in 48.34% of cases, with an average of 8.79 days and extremes of 4 and 20 days. Complications occurred in 9% of cases, with pleurisy the most common complication (4.74%). The mortality rate was 18.4%, and was highest in patients aged 1 to 12 months (53.8%).

Table 2 Clinical characteristics

Characteristics	Number	Percentage
Reason for consultation		
Cough	48	22,7
Fever	34	16,1
Respiratory distress	103	48,8
Cough + Fever	17	8,1
Cough + Respiratory distress	4	1,9
Fever + Respiratory distress	5	2,4
Functional sign		
Cough	101	47,9
Dyspnea	65	30,8
Chest pain	4	1,9
Digestive disorder	41	19,4
Physical signs		
Respiratory struggle	130	28,76
Crackling rales	204	45,13
Normal vesicular murmur	18	3,97
Decreased vesicular murmur	98	21,7
Vesicular murmur abolished	2	0,44
Sign of struggle		
Thoracoabdominal rocking	24	18,5
Nose flapping	30	23,1
Wailing	13	10
Subcutaneous tugging	57	43,8
Xiphoid funnel	6	4,6
Nutritional status		
Good	121	57,3
Severe Acute Malnutrition (SAM)	58	27,5
Moderate acute malnutrition (MAM)	32	15,2

Paraclinical characteristics

Chest X-rays in 121 patients (57.3%) showed opacity, 28.4% of them in both lung fields. The CBC in 125 patients (59.2%) showed a predominantly neutrophilic hyperleukocytosis in 60.8%, anemia in 92% and thrombocytopenia in 9.6%. C-reactive protein (CRP) values were elevated in 152 patients (72%) and 137 (64.9%). Blood cultures taken in 91 patients (43%) were positive in 12 (5.6%), with streptococcus pneumoniae (2.3%), staphylococcus aureus (1.9%), staphylococcus non aureus (0.9%) and Proteus mirabilis (0.5%) (Table 3).

Citation: Konaré H, Sacko K, Togo P, et al. Acute bacterial community-acquired pneumonia in children aged 1 month to 15 years in the pediatrics department of Gabriel Toure Teaching hospital. *J Pediatr Neonatal Care.* 2025;15(1):72–75. DOI: 10.15406/jpnc.2025.15.00587

Table 3 Distribution of patients by results of additional tests

Characteristics	Number	Percentage
Chest X-ray		
Normal	31	14,69
Opacity in both lung fields	60	28,43
Opacity in right lung field	17	8,06
Opacity in left lung field	13	6,16
Not done	90	42,65
Blood count		
Hemoglobin level		
Normal	10	8
Anemia	115	92
White blood cell count		
Normal	46	36,8
Hyperleukocytosis	76	60,8
Leukopenia	3	2,4
Blood culture		
Unrealized	120	57
Sterile	79	37,4
Streptococcus pneumoniae	*5*	*2,3*
Staphylococcus aureus	*4*	*1,9*
Staphylococcus non aureus	*2*	*0,9*
Proteus mirabilis	*1*	*0,5*
Acid-fast bacilli test		
Positive	8	3,8
Negative	24	11,4
Not tested	179	84,8

Table 4 Distribution of patients by outcome

Become	Number	Percentage
Cured	159	75,4
Deceased	39	18,4
Lost to sight	13	6,2

Discussion

Study limitations

Some complementary tests essential for diagnosis, notably PCR, procalcitonin and examination of nasopharyngeal swabs, were not feasible at the hospital laboratory. Blood cultures are taken free of charge as part of a research protocol on invasive infections. These tests are expensive in the private sector, and most patients come from families with limited resources. This limited our analysis of certain parameters.

Frequency

At the end of our study, the hospital frequency of acute community-acquired pneumonia in children aged 1 month to 15 years was 3.17%. This result is close to that of Tinsa F et al (3.6%).[9] Kané B al, had found a higher frequency (9.45%) in their 2017 study of acute community-acquired pneumonia at Mali Hospital.[10] This could be explained by the fact that our study focused specifically on pneumonia.

General patient profile

More than half (58, 3%) of the children were aged between 1 and 12 months, with an average of 18, 08 months.[11] They were correctly vaccinated against *Haemophilus influenzae* type b (Hib) and pneumococcus in 78%. This result is lower than that of Kané B al, who found that 98.9% of children were vaccinated against pneumococcus and 97.8% against *Haemophilus influenzae* type b,[10] but clearly higher than that of Azagoh-kouadio R al in Côte d'Ivoire (71.8% for *Haemophilus influenzae* type b and in and 52.6% for pneumococcus).[12]

According to the 2006 Demographic Health Survey (EDS-M6), children aged 12 to 23 months had received their third dose of vaccine against Hib and pneumococcus in 71% and 67.7% respectively.[8]

Clinical features

In our study, almost half the children (49.3%) had been admitted to hospital between 1 and 7 days after the onset of the disease. Our results are similar to those of Kané B, and et al in Mali (50.5%).[10] The long delay in consultation could be explained by the fact that parents seek care from traditional practitioners and self-medication before resorting to health centers. Respiratory distress was the most common reason for consultation (53.1%), followed by cough (22.7%). Kané B and al had made the same findings in a hospital in Mali, with a higher proportion of dyspnea (72.2%) and cough (44.2%).[10] In our study, 42.7% of children were acutely malnourished, including 27.5% of severe cases. Our results are superior to those of Okoko and al in Congo (24.5% acute malnutrition including 8.9% severe cases)[13] and Kané B and al ai Mali (18.3% severe acute malnutrition).[10] According to EDS-M5, nearly one child in ten under the age of 5 (9%) is emaciated or acutely malnourished (too thin for their size), and 3% is severely emaciated.[8] This large discrepancy with the national rate calls for a new nutritional survey. Amoxicillin/clavulanic acid was the most widely used antibiotic (82.9%).

However, amoxicillin was frequently prescribed in combination with clavulanic acid (54% and 45%),[14] followed by the combination of ceftriaxone and gentatamycin (12.8%), in contrast to Kané B and al, who found a large prescription of the combination of ceftriaxone and gentamycin (95.7%), followed by amoxicillin/clavulanic acid and gentamycin (41.9%).[10] This could be explained by the nosology of pneumopathy, which is global and requires broad-spectrum antibiotic therapy. The mean length of hospital stay was 8.79 days, with an average hospital stay of 13.6 days.[15] This result is superior to that of Azagoh-Kouadio R and al, who reported an average length of stay of 7 days in Ivory Coast.[12] Our patients were cured in 75.4% of cases, with a mortality rate of 18.4%. Our cure rate is higher than that of Kané B, and al at a hospital in Mali (60.2%)[10] but lower than that of Azagoh-Kouadio R and al (100%).[12] The mortality rate was higher than that of Kané B, and al (10.8%)[10] and Okoko and al (24%).[13] The high mortality rate could be explained not only by the strong association of pneumonia with malnutrition, which is a terrain of immunodepression, but also by the long delay in consultation and the low purchasing power of parents for adequate treatment.

Paraclinical characteristics

Radiologically, 121 patients (57.3%) had a frontal chest X-ray, with parenchymal lesions predominantly on both sides (28.4%). In the work by Azagoh-Kouadio R and al, unilateral alveolar lesions were predominant (78.8%), with preferential location in the lower lobe of the right lung (63.5%).[12] We have no explanation for this observation. We observed hyperleukocytosis in most of our patients (60.8%) and positive CRP in 64.9%. Our results are inferior to those of Kané B and al, who found 90.4% hyperleukocytosis and 72.2% positive CRP.[10]

Only 91 patients (43%) had taken blood cultures, which were positive in only 12 (5.6%). The germs identified were mainly

streptococcus pneumoniae (2.3%), *staphylococcus aureus* (1.9%) and staphylococcus non aureus (0.9%). In Ivory Coast, the bacteria identified in the study by AZAGOH-KOUADIO R and al were *Streptococcus pneumoniae* (54, 2%), *Haemophilus influenzae* (25%) and *Mycoplasma pneumoniae* (20, 8%).[12]

In Congo, the three bacteria responsible for CAP in under-5s reported by Okoko and al. were *Streptococcus pneumoniae* (17.5%), *Staphylococcus aureus* (9.6%) and *Klebsiella pnemoniae* (3.7%).[13] We note that the rate of completion of essential complementary examinations (57.3% for X-rays, 59.2% for Blood count and 43% for blood cultures) was low, probably due to parents' low purchasing power.

Conclusion

Pneumonia is common in the pediatric ward of Gabriel Toure teaching hospital, and is a public health problem in Mali despite the introduction of pneumococcal vaccine as part of routine immunization. It is diagnosed in children by a combination of fever, cough and respiratory distress, and confirmed by chest X-ray. Bacteriological confirmation remains problematic in our context.

Acknowledgements

None.

Funding

None.

Conflict of interest

The authors declare that they have no conflict of interest in the publication of this article.

References

1. Mani CS, Murray DL. *Acute pneumonia and its complications*. In: Long SS, Pickering LK, et al. Principles and practice of pediatric infectious diseases. 4 ed. Philadelphia: Saunders Elsevier. 2012;477–483.
2. Voiriot G, Chalumeau M, Messika J, et al. Risks associated with nonsteroidal anti-inflammatory drugs during pneumonia. *Rev Mal Respir*. 2018 ;35(4) :430–440.
3. Wagner N, Gehri M, Gervaix A, et al. Outpatient management of community-acquired pneumonia in children: an update. *Rev Med Suisse*. 2016;12:344–349.
4. Byington CL, Spencer LY, Johnson T, et al. An epidemiological investigation of a sustained high rate of pediatric parapneumonic empyema: risk factors and microbiological associations. *Clin Infect Dis*. 2002;34(4):434–440.
5. World Health Organization. *Pneumonia in children*. 2022.
6. Aubry P, Gaüzère BA. *Acute respiratory infections*. news 2023. Médecine tropicale.
7. De Blic J, Delacourt C. *Pediatric pneumology*. Evlyne Magné, Beatrice Brttier. Paris. 2009.
8. ICF International, National Institute of Statistics (INSTAT), Health Sector Planning and Statistics Unit, et al. *Mali demographic and health survey 2018*. 6th Edition, ICF International, Fairfax. 2019.
9. Tinsa F, Boussetta K, Gharbi A, et al. Community-acquired pneumonia in children. *Tunisia Med*. 2009;87(12).
10. Kané B, Camara MA, Dembélé G, et al. Epidemiological aspect of acute community-acquired pneumonia in children in the pediatrics department of Mali Hospital. *Mali Public Health*. 2020;10(01).
11. Berrajah L Fki, Ben Slama KA, Khbou I, et al. Viruses and atypical bacteria detected in community-acquired lower respiratory infections of children in the Sfax region of Tunisia. *Bull Soc Pathol Exot*. 2018;111(2):90–98.
12. Azagoh-Kouadio R, Couitchéré GL, Assé KV, et al. Acute community-acquired pneumonia in children aged 0 to 5 years at the Treichville teaching hospital in Abidjan (Ivory Coast). *Rev Int Sc Méd*. 2017;19(4):286–292.
13. Okoko A, Hossie E, N'djobo-mamadoud I, et al. Pneumoniae of children under 5years of age in Brazzaville (Republic of Congo). *Open J Pediatr*. 2017;7:178–191.
14. Dubosa BC, Delvartd C, Mordacqa D, et al. Evaluation of prescriptions in the management of acute community-acquired pneumonia in children. *Pediatr Arch*. 2014;30:1–7.
15. Ostermann H, Garau J, Medina J, et al. Resource use by patients hospitalized with community-acquired pneumonia in Europe: analysis of the REACH study. *BMC Pulm Med*. 2014;14:36.