Scientific Research Publishing

Open Journal of Pediatrics, 2023, 13, 313-323
https://www.scirp.org/journal/ojped
ISSN Online: 2160-8776
ISSN Print: 2160-8741

Etiologies and Prognostic Factors of Dyspnea in Infants at the University Hospital Center (CHU) of Bouaké (Ivory Coast)

Yenan John Patrick*, Yeboua Yao Kossonou Roland, Yao Kouassi Christian, Aka-Tanoh Koko Aude Hélène, Akanji Iburaima Alamun, Sahi Gnantin Josette Landryse, Adou Leioh Romeo, Amani Ehi Alexise Eleonore, Avi-Siallou Christelle Honorine, Asse Kouadio Vincent

Department of Pediatrics, Universiy Teaching Hospital of Bouake, Bouake, Ivory Coast
Email: *johnyenan@yahoo.fr, rolandyeboua13@gmail.com, yaokc777@gmail.com, audeaka@gmail.com, ibrahimakanji@gmail.com, firstsahi@yahoo.com, leioh91@hotmail.fr, amanialexise91@gmail.com, avichristelle611@gmail.com, assevin2014@gmail.com

How to cite this paper: Patrick, Y.J., Roland, Y.Y.K., Christian, Y.K., Hélène, A.-T.K.A., Alamun, A.I., Landryse, S.G.J., Romeo, A.L., Eleonore, A.E.A., Honorine, A.-S.C. and Vincent, A.K. (2023) Etiologies and Prognostic Factors of Dyspnea in Infants at the University Hospital Center (CHU) of Bouaké (Ivory Coast). *Open Journal of Pediatrics*, **13**, 313-323.
https://doi.org/10.4236/ojped.2023.133037

Received: March 15, 2023
Accepted: May 8, 2023
Published: May 11, 2023

Abstract

Identify the epidemiological characteristics, etiologies and evolutionary aspects of dyspnea in infants. This was a retrospective study of infants hospitalized for dyspnea from January 1 to December 31, 2020. The parameters studied were sex, age, origin, vaccination status, existence of underlying pathology. Underlying, the diagnosis and the evolutionary modalities. Data analysis and processing were possible using Word, Excel and EPI info version 7 software. We retained 152 infants. The sex ratio was 1.34 and the median age was 4 months. Vaccines according to expanded immunization program (EPI) were up to date in 76.32%. The main antecedents with risk identified were malnutrition, hypotrophy at birth, interventricular communication. The pathologies observed were low acute respiratory diseases in 90.79%, ENT diseases in 04.60% and cardiac diseases in 03.95%. The median length of hospitalization was 4 days. Infants who died accounted for 15.13%. The median age of infants who died was 4 months. The median time to onset of death was 1.63 days. The risk factors for death were age < 6 months ($p = 0.003$; CI [1.27; 9.33]), outdated vaccines ($p = 0.012$; CI [1.18; 5.17]), history with risk ($p = 0.031$; CI [1.02; 4.54]). Dyspnea in infants remains a concern in our service. Reducing mortality involves developing procedures for the management of lower respiratory ailments, continuous staff training and strengthening the technical platform.

Keywords

Infants, Dyspnea, Prognostic Factors

1. Introduction

Dyspnea is defined as difficult and labored breathing. It can be accompanied by a change in the respiratory rate and affect only one of the breathing times. Its origin is a cardiac or respiratory origin [1]. Its frequency was high in infants [2] [3] [4] [5]. However, there are few data on the etiologies of dyspnea in general and especially those relating to infants. The causes of these dyspneas are related to 2 mechanisms: obstructive dyspnea and non-obstructive dyspnea [6]. In our country, there are few works on dyspnea in infants, hence the interest for us to carry out this survey. The objective of our study was to identify the epidemiological characteristics, etiologies and evolutionary aspects of dyspnea in infants hospitalized in our department and to make recommendations with the aim to improve their management.

2. Patients and Methods

Our study took place in a tertiary level hospital, the CHU of Bouaké, a city located in the Center-North of Côte d'Ivoire, 350 km from the economic capital, Abidjan. The Bouaké University Hospital is the reference center and last resort in the Center-North zone of Côte d'Ivoire. It welcomes patients coming from this area and especially those from the municipality of Bouaké. This CHU has several departments, including that of Pediatrics, where the study took place, which included a neonatal block, 3 hospitalization rooms, a therapeutic nutrition unit, an awakening room and a continuous monitoring unit. The latter, made up of 8 beds, received children admitted to the pediatric ward for vital distress and had an occupancy rate of 200%. Our study population consisted of infants admitted to pediatric emergencies and hospitalized for dyspnea. Immediate management consisted of hospitalization in a continuous monitoring unit, nasopharyngeal clearing (either by aspiration or by washing with physiological serum), administration of oxygen (2 L/min by nasal prongs) to maintain saturation greater than 94% and a hydroelectrolytic contribution. Etiological treatment was initiated in parallel and regular monitoring was instituted to ensure improvement in vital parameters. Included in the study were all infants aged 29 days to 23 months, admitted to the continuous monitoring unit (USC) for dyspnea. During the study period, we identified 193 infants. We did not retain 34 hospitalized for severe malaria and 07 with incomplete patient records. Our sample was therefore 152 infants. Some infants came from regional hospitals and general hospitals located at a distance of a few dozen to several hundred km from the city of Bouaké.

This was a descriptive and analytical retrospective study of infants hospitalized for dyspnea over a period of one year from January 1 to December 31, 2020. Our survey was carried out on databases collected from individual patient records. Data collection was based on a pre-established survey form. The parameters of the study were sex, age, month of admission, origin, time to admission, mode of breastfeeding, vaccination status, existence of underlying pathology,

diagnosis at hospitalization, the length of hospitalization and the evolutionary modalities. We hospitalized infants with dyspnea on admission. We evaluated their ventilation, which is based on 4 parameters: respiratory rate, work of breathing, tidal volume and oxygenation. Indeed, tachypnea varies with age. It is >60/min before the age of 3 months, >50/min between 3 and 6 months and >40/min beyond; the evaluation of the work of breathing is based on the search for signs of struggle (thoraco-abdominal rocking, indrawing, flapping of the wings of the nose, xiphoid funnel, expiratory grunting); the tidal volume is evaluated by thoracic expansion and auscultation; oxygenation is assessed by staining the integuments and mucous membranes as well as oxygen saturation (SaO_2) [6]. The diagnosis of pulmonary infection was suggested on the association of fever, polypnoea and/or localized or diffuse crackles on auscultation [7]. The positive diagnosis of bronchiolitis was evoked in the presence of more or less febrile slowing expiratory dyspnoea associated with cough and more or less extensive wheeze auscultation, as well as crackles in the event of associated alveolitis [8]. We considered as hypotrophic, that is to say low weight for gestational age, newborns with a birth weight lower than the tenth percentile [9] [10]. We recommend, in accordance with the recommendations, exclusive breastfeeding for 6 months, dietary diversification between 6 and 12 months and a totally diversified diet from the age of one [11]. In practice, we consider poor dietary behavior any deviation from one of these recommendations. The confidentiality of patient records was ensured by assigning an anonymity number during data collection. There is no conflict of interest. Data analysis and processing were possible using Word, Excel and EPI info version 7 software. The relative risk was calculated and presented with its limits in the 95% confidence interval and the significance threshold was set at $p < 0.05$

3. Results

At the end of the study, we retained 152 infants out of the 193 hospitalized for dyspnea in the pediatric department. Girls were 65 (42.76%) and boys 87 (57.24), giving a sex ratio of 1.34. Infants under 3 months accounted for 32.24% and those under 6 months 57.24%; the different age groups are described in **Table 1**. The median age observed was 4 months with an interquartile range of 2 to 9 months. The median time to admission was 4 days with an interquartile range of 2 to 7 days. This admission time was less than 3 days in 29.61% and less than 7 days in 63.16%. Patients came from home, urban health centers, regional hospitals and general hospitals (**Table 1**). Breastfeeding was exclusive in 46.71% and other modes of breastfeeding in 53.29% (**Table 1**). Vaccines from the expanded immunization program (EPI) were up to date in 76.32%. No pathological history was found in 75.67%. The main antecedents at risk identified were malnutrition, hypotrophy at birth, interventricular communication. The pathologies observed were low acute respiratory diseases in 90.79%, ENT in 04.60% and cardiac in 03.95%. The distribution of diagnoses has been specified in **Table 2**. We found, during the period from September to December 2020, 49 cases (67.65%) of

bronchiolitis, 22 cases (53.66%) of acute pneumonia Community (CAP). The frequencies of dyspnea and these conditions are shown in Figure 1. The median duration of hospitalization in our department was 4 days with an interquartile range of 2 to 7 days. The infants discharged from the cured department numbered 122, or 80.26%, and those who died represented 15.13%; seven infants were transferred to the Pneumo-phtisiology department (PPH) for pleural drainage and also came out cured. The deaths concerned 9 girls or 39.13% and 14 boys or 60.87%. The median time to death recorded was 1.63 days with an interquartile range of 0.43 days (10 h) to 3 days. The median age of infants who died was 4 months with an interquartile range of 1.95 to 4.85 months. Infants under 3 months and under 6 months who died accounted for 39.13% and 82.61%

Table 1. Distribution of epidemiological parameters in children hospitalized for dyspnea.

Epidemiological parameters		Frequences	Percentages
Sex	Féminin	65	42.76
	Masculin	87	57.24
Age (months)	[1; 6[	87	57.24
	[6; 12[	35	23.02
	[12; 24[	30	19.74
Breastfeeding methods	Exclusif	71	46.71
	Dominant	58	38.16
	Artificial	06	03.95
	Mixed	17	11.18
History with risk	None	117	76.97
	Malnutrition	14	09.21
	Hypotrophy at birth	08	05.26
	Ventricular septal defect	03	01.97
	other*	10	06.59
Origin	Home	86	56.58
	Urban Health Center	36	23.68
	General Hospital	10	06.58
	Regional Hospital Center	12	07.89
	Other**	08	05.26
Vaccination status according to PEV	Updated	116	76.32
	Not updated	36	23.68
Evolution	Discharge from hospital	122	80.26
	Referred to the Pneumo-phtisiology service (PPH)	07	04.61
	Died	23	15.13
Total		**152**	**100.00**

*Others: bronchiolitis (2), premature (2), trisomic facies (2), HIV mother (2), pneumonia (1), Prune Belly (1), **others: nursery (3), rural health center (1), clinic (1), sisters' hospital (1), surgical emergencies (1) and resuscitation (1).

Table 2. Distribution of diagnoses in infants hospitalized for dyspnea.

Diagnoses		Frequences	Percentages
Lower respiratory diseases		**139**	**91.45**
	Bronchiolitis	85	55.92
	Acute community acquired pneumonia	41	26.97
	Inhalation pneumonia	02	01.32
	Infant Asthma	01	00.66
	Complications of pneumonia*	09	05.92
	Primary tuberculosis infection	01	00.66
Other infections		**13**	**09.55**
ENT (Ear Nose and Throat) diseases 07 (04.60%)	Subglottic Laryngitis	04	02.63
	Subglottic Angioma	01	00.66
	Tracheomalacia	01	00.66
	Nasopharyngitis + nasal obstruction	01	00.66
Cardiac Pathologies 06 (03.95%)	Ventricular septal defect	03	01.97
	Atrioventricular canal	01	00.66
	Clinically suspected heart diseases	02	01.32
Total		**152**	**100.00**

*: Purulent pleurisy: 05 (03.29%), Pyo-pneumothorax: 03 (01.97%), Hydro-pneumothorax: 01 (00.66%).

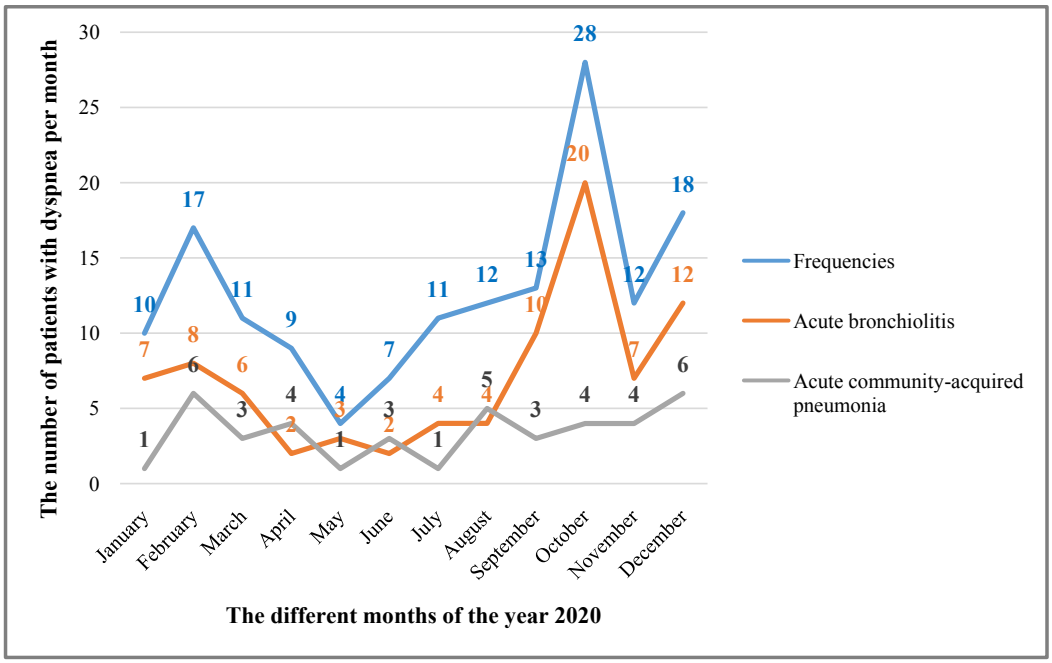

Figure 1. Distribution of the frequencies of dyspnea, acute bronchiolitis and Community-acquired pneumonia in infants hospitalized for dyspnea.

respectively. The distribution of these deaths according to the pathologies is illustrated in Figure 2. Acute bronchiolitis represented 52.17% of deaths with a lethality of 14.12%. The patient hospitalized for the primary tuberculosis infection died. We recorded 2 deaths or 33.33% among the cases of heart disease. CAP lethality was 17.07%. We noted certain factors related to death which were among others, age less than 6 months, history with risk, outdated EPI vaccines with a statistically significant difference. The analysis of these factors has been transcribed in Table 3.

Table 3. Risk factors for death in infants hospitalized for dyspnea.

Parameters		Deceased	Alive	p	RR [IC]
Sex	Male	14	73	0.36 (ns)	1.16 [0.53; 2.52]
	Female	09	56		
Age (months)	[1; 6[	19	68	0.003 (S)	3.55 [1.27; 9.33]
	[6; 24[	04	61		
Delay (days) of admission	≥3	18	89	0.19 (ns)	1.51 [0.60; 3.83]
	<3	05	40		
Breastfeeding method	Other*	14	67	0.22 (ns)	1.36 [0.63; 2.96]
	Exclusif	09	62		
Origin	Out of Bouaké	05	18	0.18 (ns)	1.56 [0.64; 3.78]
	City of Bouaké	18	121		
Immunization according to the PEV	Not updated	10	26	0.012 (S)	2.48 [1.18; 5.17]
	Updated	13	103		
History with risk	Yes	09	26	0.031 (S)	2.15 [1.02; 4.54]
	None	14	103		

*: Dominant, artificial, mixed.

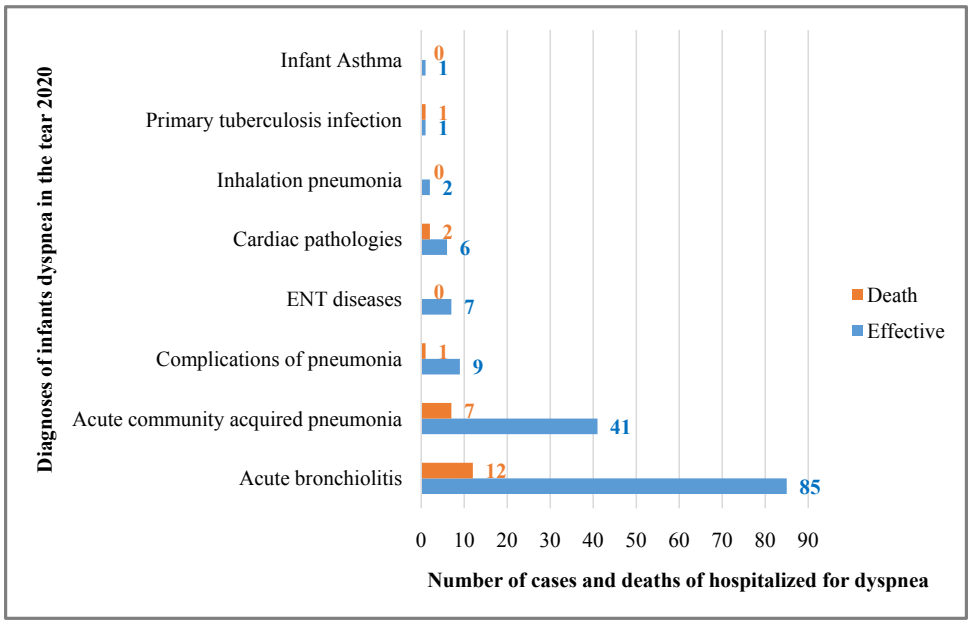

Figure 2. Distribution of numbers and deaths of infants hospitalized for dyspnea according to diagnoses.

4. Discussion

During 2020, 193 infants were hospitalized with dyspnea, but 152 were retained. The limitations of the study were related to the difficulties relating to the assessment of the severity criteria of the various conditions in question. Indeed, the elements of gravity, such as age varied from one pathology to another. For example, bronchiolitis and pneumonia are considered severe at ages less than 6 weeks and 6 months, respectively. In addition to these elements, due to the retrospective nature of our study, the impact of environmental factors [12] [13] [14] could not be assessed. In addition, the identification of the germs responsible for acute respiratory infections could not be carried out. Nevertheless, despite these limitations, we have made observations which have given rise to some comments.

Epidemiologically, we observed a variation in cases depending on the month with peak admission frequencies, in particular in the months of February, October and December 2020 during which there were 17, 28 and 18 cases respectively. These numbers would reflect the seasonality likely associated with respiratory infections. Indeed, we noticed 2 frequency peaks concerning bronchiolitis, particularly in October and December. Seck, in Dakar during a retrospective study about acute bronchiolitis in 2017, noted two frequency peaks during the cool months of the year (February, March and April) and during the rainy season (July, August and September) [15]. In France, the period of bronchiolitis begins in October and ends at the end of winter [12] [16]. Kané, in Mali in 2017, also noted peaks in the frequency of pneumonia in the months of September (12.9%) and October (10.8%) [17]. All these results showed the influence of the seasons on the occurrence of acute respiratory infections with frequency variations depending on the geographical area.

We observed, like some authors, a slight male predominance (sex-ratio = 1.34) [18]. Infants under 6 months represented more than half of the cases and those under 3 months nearly a third of our study population. These figures could be explained by the fact that infectious viral rhinitis is manifested by nasal obstruction which can interfere with breathing and feeding in young infants [19], and therefore justify their hospitalization. Most infants arrived at our pediatric department after 3 days; which testified either self-medication, or their passage through health centers before being referred to our service (center of last resort of the health pyramid in the center-north zone of Côte d' Ivoire).

At the diagnostic level, acute lower respiratory conditions accounted for more than 90% of our workforce. They were dominated by infections which accounted for more than 85%. They concerned, in order of frequency, bronchiolitis, CAP and complications of CAP (0.92%). These infections are a major cause of morbidity in children with an incidence of 240‰ in infants under 1 year old [18]. The other conditions, around 8%, concerned congenital heart disease and ENT pathologies (**Table 2**). The latter, apart from laryngeal pathologies, were mostly referred directly to the ENT department, thus justifying their low proportion in

our study. In addition, nasopharyngitis, angina and otitis were in the majority of cases treated on an outpatient basis. Congenital heart disease, although the most frequent congenital malformations, has an overall incidence of 5 to 8‰ [20] [21].

At the evolutionary level, the median length of stay for our patients was 4 days. Indeed, patients were discharged with outpatient treatment generally 48 hours after the stability of the clinical state. Hospitalization stays varied according to the pathologies concerned and were longer in the event of the occurrence of complications or the persistence of clinical signs which would sometimes express therapeutic ineffectiveness, sometimes witnessing a diagnostic delay. The unfavorable evolution was the cause of death in 15.13% of cases. Over 75% of deaths were in infants under 5 months and the majority of these deaths occurred within 48 hours of admission. We have also seen very high lethality. The lethality of acute bronchiolitis (14.12%) remained much higher than those reported in the series of Seck in Dakar (1.6%) and Doumbia (1.8%) [2] [15]. The figures that we observed explained the difficulties encountered in infants, and could be linked to the severity of the clinical picture (34.78% of deaths occurred in the first 24 hours), to the quality of surveillance (an occupancy rate of 200%), the failure of the technical platform or the delay in treatment due to the median time for admission to our department, which was 4 days. On the other hand, we did not note any death relating to laryngeal affections. The generalization of vaccinations against Haemophilus influenzae serotype b and measles has completely changed the epidemiology and severity of laryngitis [22]. Deaths in our study were influenced by factors including age less than 6 months, history with risk (undernutrition, birth hypotrophy, and ventricular septal defect), and incomplete EPI vaccination. Indeed, infants under 6 months of age run a 3 times higher risk of die, because this age group is considered to be a serious factor in certain pathologies in question, in this case CAP [14]. Furthermore, it has been reported that most deaths caused by bronchiolitis occur in infants aged less than 6 months, who have a history of prematurity or underlying cardiological pathology [23]. Infants whose EPI vaccination was not up to date had more than 2 times the risk of dying than the others. In fact, the impact of vaccinations has been described, mainly that of conjugate vaccines against Haemophilus influenzae b (Hib) and streptococcus pneumoniae (7-valent, then 13-valent PCV), which have considerably reduced incidence and severity of childhood CAP [24]. The death rate of infants with a history of risk was twice as high as that of those without a history, due to their greater exposure to the risk of presenting serious forms. Sagbo in Benin also reported that malnutrition and vaccination status were factors associated with deaths related to respiratory distress in infants [25].

These figures and risk factors for death found in our study highlight the problems our services have in achieving the Sustainable Development Goals (SDGs) with regard to child health, *i.e.* eliminating preventable deaths among these children. Reducing mortality therefore appears to be a priority. To do this, it

would be necessary to improve the conditions of care for children by equipping the various health structures with essential materials and qualified human resources, by developing decision-making algorithms relating to the clinical pictures encountered and setting up patient referral procedures. When an infant is admitted to the emergency department for dyspnea, clinical analysis is essential to assess the signs of severity in order to propose appropriate measures [7]. The population should also be educated to go to health centers as soon as possible in order to avoid the occurrence of complications that can lead to death, and follow-up should be planned when patients have a history with risk. It would be necessary to insist on preventive measures, in particular hand hygiene measures, avoidance of places at risk of contamination (confined public places) [12] and above all correct vaccination for age, in particular for Hib and PCV-13 [24].

5. Conclusion

Infant dyspnea remains a concern in our department. They are caused by pulmonary, cardiac and ENT pathologies and are responsible for many deaths in pediatric hospitalization. Reducing mortality requires the development of dyspnea management procedures, continuous staff training and the strengthening of the technical platform, and above all the adequate treatment of cases at different levels of the health pyramid and the early referral of serious cases.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] De Delamare, J. and Garnier, M. (2011) Dictionnaire illustré des termes de médecine. 30th Edition, Maloine, Paris, 266.

[2] Doumbia, A.K., Togo, P., Coulibaly, O., Dembélé, A., Sacko, K., Maiga, B., *et al.* (2018) La bronchiolite aiguë du nourrisson: À propos de 112 cas hospitalisés au département pédiatrie du CHU Gabriel Touré. *Revue Malienne d'Infectiologie et de Microbiologie*, **11**, 42-47. https://doi.org/10.53597/remim.v0i1.985

[3] Ly, F., Camara, B., Ly Ba, A., Sall Diouf, A., SaKho Kane, A., Sow, A., *et al.* (2019) Etude des caractéristiques épidémiologiques, cliniques, radiologiques et évolutives des infections respiratoires aiguës basses (IRAB) au service de Pédiatrie du CHN de Pikine (Dakar/Senegal). *Revue Africaine et Malgache pour la Recherche Scientifique/Sciences de la Santé*, **1**, 108-118.

[4] Benchekroun, I., Boubkraoui, M.E.M., Mekaoui, N., Karboubi, L., Mahraoui, C., Sououd, B., *et al.* (2017) Profil épidémiologique des pathologies respiratoires chez l'enfant à l'Hôpital d'Enfants de Rabat, Maroc. *Pan African Medical Journal*, **28**, Article No. 288. https://doi.org/10.11604/pamj.2017.28.288.13405

[5] Kinda, G., Millogo, G.R.C., Koueta, F., Dao, L., Talbousouma, S., Cissé, H., *et al.* (2015) Cardiopathies congénitales: Aspects épidémiologiques et échocardiographiques à propos de 109 cas au centre hospitalier universitaire pédiatrique Charles de Gaulle (CHUP-CDG) d'Ouagadougou, Burkina Faso. *Pan African Medical Journal*, **20**, Article No. 81.

[6] Fuger, M. and Cheron, G. (2020) Dyspnée aiguë du nourrisson. In: Bourrillon, A., Benoist, G., Chabrol, B., Chéron, G. and Grimprel, E., Eds., *Pédiatrie pour le praticien*, 7th Edition, Elsevier Masson, Paris, 715-718.

[7] Mandelcwajg, A. (2018) Pneumonies infectieuses. In: Chéron, G., Ed., *Urgences Pédiatriques*, 5th Edition, Elsevier Masson, Paris, 332-338. https://doi.org/10.1016/B978-2-294-75971-0.00039-0

[8] Gajdos, V. (2018) Bronchiolite aiguë virale. In: Chéron, G., Ed., *Urgences Pédiatriques*, 5th Edition, Elsevier Masson, Paris, 323-327. https://doi.org/10.1016/B978-2-294-75971-0.00037-7

[9] Nuytten, A. (2020) Prématurité: Généralités. *EMC—Pédiatrie*, 1-6.

[10] Lopez, E. and Jarreau, P.-H. (2011) Prématurité et hypotrophie. In: Bourrillon, A., Brémond-Gignac, D., Brion, F., Chabrol, B., Chantepie, A., Chouraqui, J.-P., *et al.*, Eds., *Pédiatrie Pour le Praticien*, 6th Edition, Elsevier Masson, Paris, 31-37.

[11] Turc, D. (2020) Apports conseillés et alimentation du nourrisson. In: Bourrillon, A., Benoist, G., Chabrol, B., Chéron, G. and Grimprel, E., Eds., *Pédiatrie Pour le Praticien*, 7th Edition, Elsevier Masson, Paris, 113-119.

[12] Fuger, M., Timsit, S. and Cheron, G. (2020) Bronchiolite aiguë du nourrisson. In: Bourrillon, A., Benoist, G., Chabrol, B., Chéron, G. and Grimprel, E., Eds., *Pédiatrie Pour le Praticien*, 7th Edition, Elsevier Masson, Paris, 718-720.

[13] Bourrillon, A. (2017) Bronchiolite aiguë du nourrisson. In: Bourrillon, A., Benoist, G. and Delacourt, C., Eds., *Pédiatrie: Réussir ses ECNi*, 7th Edition, Elsevier Masson, Paris, 651-659.

[14] Bourrillon, A. (2017) Pneumonies aiguës communautaires. In: Bourrillon, A., Benoist, G. and Delacourt, C., Eds., *Pédiatrie: Réussir ses ECNi*, 7th Edition, Elsevier Masson, Paris, 692-706.

[15] Seck, N., Basse, I., Keïta, Y., Boiro, D., Thiam, L., Ndongo, A.A., *et al.* (2018) La bronchiolite aiguë du nourrisson en milieu tropical. *Journal de Pédiatrie et de Puériculture*, **31**, 241-246. https://doi.org/10.1016/j.jpp.2018.09.007

[16] CMIT (2020) Bronchiolite aiguë du nourrisson. 27th Edition, ALINEA Plus, Ile-de-France, 193-195.

[17] Kané, B., Camara, M.A., Dembélé, G., Togo, S., Traoré, M.M. and Diallo, K.W. (2020) Aspect épidémiologique des Pneumopathies Aigues Communautaires de l'enfant dans le Service de Pédiatrie de l'Hôpital du Mali. *Mali Sante Publique*, **10**, 64-70. https://doi.org/10.53318/msp.v10i1.1665

[18] Brouard, J., Vabret, A., Nimal-Cuvillon, D., Bach, N., Bessière, A., Arion, A. and Freymuth, F. (2008) Bronchopneumopathies aiguës de l'enfant. EMC (Elsevier Masson SAS, Paris), Pédiatrie, 4-064-A-10, 16 p. https://doi.org/10.1016/S1637-5017(08)72417-7

[19] François, M. (2020) Infections ORL. In: Bourrillon, A., Benoist, G., Chabrol, B., Chéron, G. and Grimprel, E., Eds., *Pédiatrie Pour le Praticien*, 7th Edition, Elsevier Masson, Paris, 449-457.

[20] Batisse, A. (2013) Etiologies des cardiopathies congénitales. In: Batisse, A., Fermont, L. and Lévy, M., Eds., *Cardiologie Pédiatrique Pratique: Du fœtus à l'adulte*, 4th Edition, Doin, Paris, 52-85

[21] Iselin, M. (1999) Cardiopathies congénitales. EMC—Pédiatrie—Maladies Infectieuses, 1-6 [Article 4-070-A-05].

[22] CMIT (2020) Laryngites et épiglottites. 27th Edition, ALINEA Plus, Ile-de-France, 191-92.

[23] Gajdos, V. and Beydon, N. (2011) Bronchiolite aiguë du nourrisson. In: Beydon, N., Ed., *Pneumologie Pédiatrique*: *Guide pratique*, Elsevier Masson, Paris, 1-9. https://doi.org/10.1016/B978-2-294-70932-6.00001-3

[24] Fouad, M. (2020) Infections Pulmonaires. In: Bourrillon, A., Benoist, G., Chabrol, B., Chéron, G. and Grimprel, E., Eds., *Pédiatrie Pour le Praticien*, 7th Edition, Elsevier Masson, Paris, 457-463.

[25] Sagbo, G.G., Padonou, C., Tohodjèdé, Y., Bognon, G., Bello, D. and Oké-Vê, F. (2017) Détresse respiratoire du nourrisson au CHUD-OP de Porto-Novo: Épidémiologie, causes et évolution à propos de 320 cas. *Journal Africain de Pédiatrie et de Génétique Médicale*, **2**, 40-46.