

RESUMO

DURAÇÃO DE VÔMITO MAIOR OU IGUAL A 2,5 DIAS: FATOR INDEPENDENTEMENTE ASSOCIADO COM PIOR EVOLUÇÃO EM CRIANÇAS COM BRONQUIOLITE: Introdução: Bronquiolite é a principal causa de internamento em lactentes. É uma doença de curso variado. O grupo de crianças que evolui com deterioração clínica encontra-se mal definido na literatura. Objetivo: Identificar fatores presentes na admissão que são associados com pior evolução em crianças hospitalizadas com bronquiolite. Metodologia do Estudo: Estudo de coorte prospectivo conduzido em enfermaria pediátrica nas Obras Sociais Irmã Dulce, Salvador, Brasil, realizado de maio de 2015 a julho de 2016. Critérios de inclusão: Idade <2 anos, diagnóstico de bronquiolite na admissão hospitalar e assinatura do termo de consentimento livre e esclarecido (TCLE). Dados clínicos, exame físico na admissão e desfechos foram registrados. Um modelo de regressão logística multivariada ajustado para idade foi utilizado para avaliar associação entre necessidade de tratamento em Unidade de Terapia Intensiva (UTI) e duração de internamento hospitalar (DIH) ≥ 5 dias (variáveis de desfecho) e fatores detectados durante admissão (variáveis preditoras). Resultados: O grupo de estudo compreendeu 172 pacientes. Destes, 5 (2.9%; IC 95%: 1.1%-6.3%) foram transferidos para UTI e 69 (40.1%; IC 95%: 33.0%-47.6%) tiveram DIH ≥ 5 dias. A mediana da idade foi 5.2 meses (IQR: 3.6-8.2) e a mediana da duração de vômitos foi de 1 dia (IQR: 1-3); prematuridade <30 semanas (3.5%), <37 semanas (14.5%) foram reportados, além de desnutrição grave (4.7%) e presença de estertores crepitantes na ausculta pulmonar (27.9%). Desnutrição grave (OR 21.53; IC95% 1.43-323.66), prematuridade <30 semanas (OR 13.85; IC95% 1.23-155.89) e duração de vômitos (OR 1.92; 95% CI 1.16-3.17) foram independentemente associados com transferência para UTI. Prematuridade <37 semanas (OR 3.89; IC95% 1.55-9.79) e presença de estertores crepitantes na ausculta

pulmonar durante admissão (OR 3.11;95%CI 1.45–6.70) foram independentemente associados com DIH ≥ 5 dias. A area abaixo da curva ROC entre duração de vômito como fator preditor de transferência para UTI foi 0.92(IC95% 0.81–1.04) com ponto de corte na melhor performance 2.5 dias (sensibilidade 100%; especificidade 79%). Conclusão: Crianças admitidas com bronquiolite e relatando vômitos por ≥ 2.5 dias devem receber atenção máxima.

Palavras-chaves: 1. Bronquiolite; 2. Fatores de risco; 3. Desfecho; 4. UTI

ABSTRACT

OBJECTIVE: To identify factors present upon admission that are associated with worsening evolution among children hospitalized with bronchiolitis.

METHODS: This prospective cohort was conducted at the pediatric ward of the Children's Hospital, Salvador, Brazil, from May 2015 to July 2016. Inclusion criteria comprised age <2 years, admission to hospital due to bronchiolitis, and written informed consent. Clinical data, physical findings upon admission and outcome were registered. Multi-variable logistic regression analysis in a model adjusted for age was used to assess association between Intensive Care Unit (ICU) treatment/length of hospital stay (LOS) ≥ 5 days (outcome variables) and factors detected upon admission (predictor variables).

RESULTS: The study group comprised 172 patients, out of which 5 (2.9%;95%CI:1.1%-6.3%) were transferred to ICU and 69 (40.1%;95%CI:33.0%-47.6%) whose LOS ≥ 5 days. Overall, the median age was 5.2 months (IQR:3.6-8.2) and the median duration of vomiting was 1 day (IQR:1-3); prematurity <30 weeks (3.5%), <37 weeks (14.5%) were reported and severe malnutrition (4.7%) and crackles (27.9%) were found. Severe malnutrition (OR 21.53;95%CI 1.43–323.66), prematurity <30 weeks (OR 13.85;95%CI 1.23–155.89) and duration of vomiting (OR 1.92;95%CI 1.16–3.17) were independently associated with ICU transfer. Prematurity <37 weeks (OR 3.89;95%CI 1.55–9.79) and crackles (OR 3.11;95%CI 1.45–6.70) were independently associated with LOS ≥ 5 days. The area under the ROC curve for duration of vomiting to predict transfer to the ICU was 0.92(95%CI 0.81–1.04) the cutoff for best performance being 2.5 days (sensitivity 100%; specificity 79%).

CONCLUSION: Children admitted with bronchiolitis reporting vomiting ≥ 2.5 days should receive maximal attention.

Key-words: 1. Bronchiolitis; 2. Risk factors; 3. Outcome; 4. ICU

Figure 1. ROC curve for duration of vomiting to predict transfer to ICU.

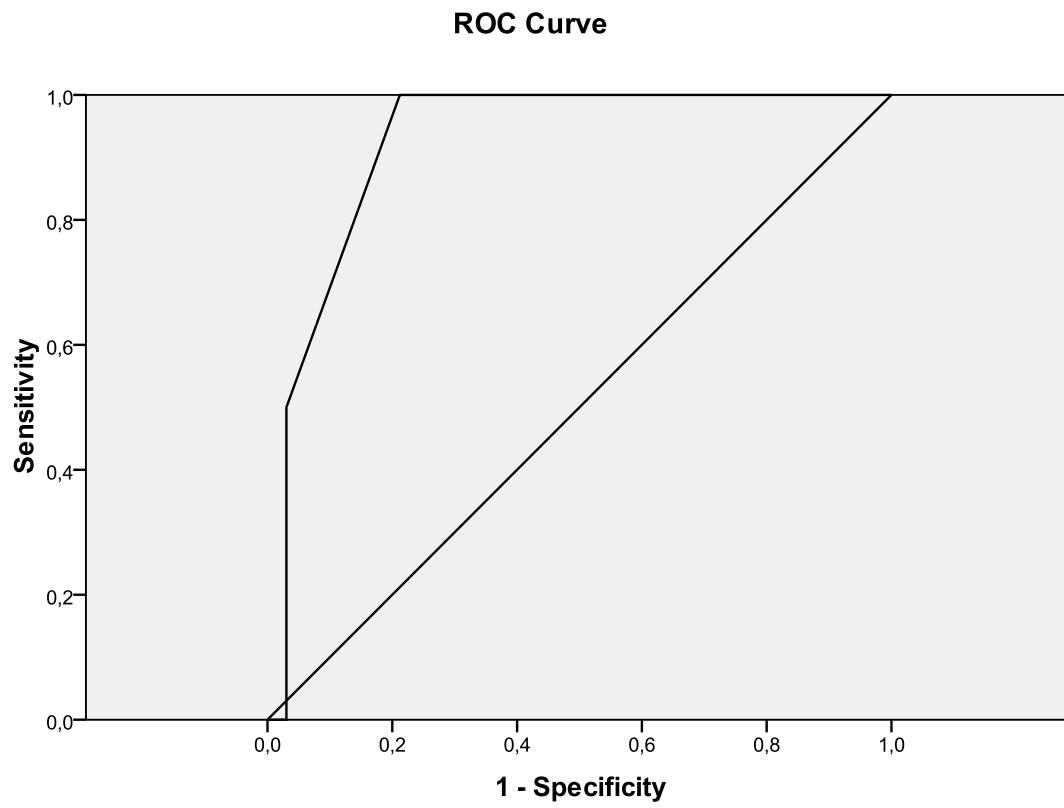


Table 1. Baseline characteristics of 172 children hospitalized with bronchiolitis

Characteristics	n (%)	Median (p25-p75)
Age (months)		5.2 (3.6 – 8.2)
< 2 month	15 (8.7)	
2 – 11 month	138 (80.2)	
≥ 12 months	19 (11.1)	
Male gender	109 (63.4)	
Race		
Mixed	87 (50.6)	
Black	57 (33.1)	
White	28 (16.3)	
History		
Duration of disease ≤ 7 days	133/171 (77.8) ^a	
Duration of disease ≤ 5 days	89/171 (52.0) ^a	
Difficulty breathing	163/171 (95.3) ^a	2.0 (1 – 4) ^c
Cough	160/171 (93.6) ^a	5.0 (3 - 7) ^c
Fever	97/171 (56.7) ^a	2.0 (1 – 3) ^c
Wheezing	70/171 (40.9) ^a	2.0 (1 – 4) ^c
Vomiting	35/171 (20.5) ^a	1.0 (1 – 3) ^c
Co-morbidities	10 (5.8)	
Congenital heart disease	4 (2.3) ^b	
Chronic lung disease	2 (1.2) ^b	
Down's syndrome	1 (0.6)	
Diabetes mellitus type 1	1 (0.6)	
Chronic liver disease	1 (0.6)	
Sickle cell disease	1 (0.6)	
HIV – infected mother	1 (0.6)	
Hydronephrosis	1 (0.6) ^b	
Obstetric history		
Prematurity < 30 weeks	6 (3.5)	
Prematurity 30 – 36 weeks	19 (11.0)	
Delivery		
Vaginal	109/171 (63.8) ^a	
C – section	62/171 (36.2) ^a	
Smoking mother during pregnancy	20 (11.6)	
Mother with asthma during pregnancy	7 (4.1)	
Mechanical ventilator	8 (4.7)	
Season of birth		
Summer	59 (34.3)	
Spring	38 (22.1)	
Fall	38 (22.1)	
Winter	37 (21.5)	

Infant history	
Atopic dermatitis	2 (1.2)
Previous bronchiolitis	2 (1.2)
Palivizumab use	1 (0.6)
Environmental factor	
Smokers at home	42 (24.4)
Mold at home	65 (37.8)
Breastfeeding	
Currently exclusive	43 (25)
Currently non-exclusive	73/167 (43.7) ^a
Mother's history of atopy	47 (27.3)
Asthma	22 (12.8)
Rhinitis	20 (11.6)
Bronchitis	4 (2.3)
Eczema	1 (0.6)
Physical examination	
Fever ($\geq 37.4^{\circ}\text{C}$)	7/145 (4.8) ^a
Tachypnea ≥ 70 breaths/min	7/168 (4.2) ^a
Tachycardia ≥ 200 beats/min	0
RDAI score ^d	
0 – 5 points	138/170 (81.2) ^a
6 – 10 points	32/170 (18.8) ^a
Nutritional status	
Well-nourished	142 (82.6)
Malnutrition	13 (7.6)
Severe malnutrition	8 (4.7)
Overweight	7 (4.1)
Obesity	2 (1.2)
Sensorial status	
Normal	168 (97.7)
Irritable	3 (1.7)
Lethargic	1 (0.6)
Chest retraction	84 (48.8)
Prolonged expiratory phase	26/170 (15.3) ^a
Hypersonant chest	2/167 (1.2) ^a
Stridor	4/171 (2.3) ^a
Reduced vesicular murmur	5 (2.9)
Rhonchi	77 (44.8)
Expiratory wheezing	69/171 (40.4) ^a
Inspiratory wheezing	15/170 (8.8) ^a
Crackles	48 (27.9)
Regular cardiac rhythm	172 (100)

Normal heart sounds	172 (100)
Cardiac murmurs	2 (1.2)
Enlarged liver	4 (2.3)
Enlarged spleen	1 (2.3)
Abdominal bloating	4 (2.3)
Cyanosis	0

^a The denominator was not 172 because there was missing information.

^b One patient presented cardiac disease and chronic lung disease concomitantly and another patient presented chronic lung disease and hydronephrosis concomitantly.

^c Duration in days

^d Respiratory Distress Assessment Instrument score

Table 2. Comparison of baseline characteristics between patients who were or were not transferred to ICU and between patients who did or did not stay ≥ 5 days in the hospital

Characteristics	Intensive Care Unit treatment			Length of hospital stay ≥ 5 days		
	Yes n = 5	No n = 167	<i>p</i>	Yes n = 69	No n = 103	<i>p</i>
Age (months) ^a	7.1 (4.1 – 6.8)	5.1 (1 – 23)	0.5	5.0 (1.1 – 23.0)	5.3 (1.0 – 22.2)	0.3
Male gender	4 (80.0)	105 (62.9)	0.7	44 (63.8)	65 (63.1)	0.9
Mixed or Black race	5 (100)	139 (83.2)	1.0	57 (82.6)	87 (84.5)	0.7
History						
Duration of disease ≤ 7 days	4 (80.0)	129/166 (77.7) ^b	1.0	49/68 (72.1) ^b	84 (81.6)	0.1
Duration of disease ≤ 5 days	2 (40.0)	87/166 (52.4) ^b	0.7	34/68 (50) ^b	55 (53.4)	0.7
Difficulty breathing	5 (100)	158/166 (95.2) ^b	1.0	65/68 (95.6) ^b	98 (96.1)	0.1
Duration of difficulty breathing (days) ^a	1 (1-8.5)	2 (1-4)	0.4	2 (1-4)	2 (1-4)	0.9
Cough	5 (100)	155/166 (93.4) ^b	1.0	61/68 (89.7) ^b	99 (96.1)	0.1
Duration of cough (days) ^a	3 (2 – 6.5)	5 (3 - 7)	0.3	5 (3-7)	5 (3-7)	0.8
Fever	2 (40.0)	95/166 (57.2) ^b	0.7	37/68 (54.4) ^b	60 (58.3)	0.6
Duration of fever (days) ^a	2 (1 – 3)	2 (1 – 3)	0.9	2 (1-3)	2 (1-3)	0.9
Wheezing	1 (20.0)	69/166 (41.6) ^b	0.7	33/68 (48.5) ^b	37 (35.9)	0.1
Duration of wheezing (days) ^a	4 (4-4)	2 (1 – 3.5)	0.3	2 (1,5 – 4)	2 (1 – 3)	0.1
Vomiting	2 (40.0)	33/166 (19.9) ^b	0.3	15/68 (22.1) ^b	20 (19.4)	0.7
Duration of vomiting (days) ^a	4 (3 – 5)↑	1 (1 – 2)	0.026	1 (1-3)	1 (1-2)	0.8
Co-morbidities						
Congenital heart disease	0	4 (2.4)	1.0	3 (4.3)	1 (1.0)	0.3
Chronic lung disease	0	2 (1.2)	1.0	2 (2.9)	0	0.2
Down's syndrome	0	1 (0.6)	1.0	1 (1.4)	0	0.4

Obstetric history						
Prematurity < 30 weeks	2 (40.0)↑	4 (2.4)	0.01	6 (8.7)↑	0	0.004
Prematurity 30 – 36 weeks	0/3 (0) ^c	19 / 163 (11.7) ^c	1.0	11/63 (17.5) ^c	8 (7.8) ^c	0.06
C - section delivery	1 (20)	61/166 (36.7) ^b	0.7	24 (34.9)	38 (37.3)	0.7
Smoking mother during pregnancy	0	20 (12.0)	1.0	7 (10.1)	13 (12.6)	0.6
Mother with asthma during pregnancy	0	7 (4.2)	1.0	1 (1.4)	6 (5.8)	0.2
Neonatal mechanical ventilator	0	8 (4.8)	1.0	5 (7.2)	3 (2.9)	0.3
Season of birth						
Spring	0	38 (22.8)	0.6	12 (17.4)	26 (25.2)	0.2
Summer	1 (20.0)	58 (34.7)	0.7	26 (37.7)	33 (32.0)	0.4
Fall	2 (40.0)	36 (21.6)	0.3	13 (18.8)	25 (24.3)	0.4
Winter	2 (40.0)	35 (21.0)	0.3	18 (26.1)	19 (18.4)	0.2
Infant history						
Atopic dermatitis	0	2 (1.2)	1.0	1 (1.4)	1 (1.0)	1.0
Environmental factor						
Smokers at home	0	42 (25.1)	0.3	14 (20.3)	28 (27.2)	0.3
Breastfeeding						
Currently exclusive	1 (20)	42 (25.1)	1.0	14 (20.3)	29 (28.2)	0.2
Currently non-exclusive	1 (20)	72/162 (44.4) ^b	0.4	22 /68 (32.4) ^b	51/99 (51.5) ^b ↑	0.01
Mother's history of atopy	1 (20)	46 (27.5)	1.0	18 (26.1)	29 (28.2)	0.8
Physical examination						
Malnutrition	0	13/161 (8.1) ^b	1.0	7/61 (11.5) ^b	6 (5.8)	0.2
Severe malnutrition	2 (40.0)↑	6 (3.6)	0.02	8 (11.6)↑	0	0.001
Fever (≥ 37.4°C)	0	7/140 (5.0) ^b	1.0	4/58 (6.9) ^b	3/87 (3.4) ^b	0.4
Tachypnea ≥ 70 breaths/min	0	5/163 (3.1) ^b	1.0	1/67 (1.5) ^b	4/101 (4.0) ^b	0.6

RDAI ^d score 6 – 10 points	1 (20.0)	31/165 (18.8) ^b	1.0	16/68 (23.5) ^b	16/102 (15.7) ^b	0.2
Chest retraction	3 (60.0)	8 (48.5)	0.7	40 (58.0)	44 (42.7)	0.05
Prolonged expiratory phase	4 (80.0)	140/165 (84.8) ^b	0.6	9/68 (13.2) ^b	17/102 (16.7) ^b	0.5
Rhonchi	4 (80.0)	91 (54.5)	0.4	27 (39.1)	50 (48.5)	0.2
Expiratory wheezing	1 (20.0)	68/166 (41.0) ^b	0.6	30.0 (44.1)	39 (37.9)	0.4
Inspiratory wheezing	1 (20.0)	14/165 (8.5) ^b	0.4	8/68 (11.8) ^b	7/102 (6.2) ^b	0.3
Crackles	2 (40.0)	46 (27.5)	0.6	26 (37.7) [↑]	22 (21.4)	0.02

Results as n (%) otherwise when not informed.

^a Results as median (interquartile range).

^b Different denominator due to missing information.

^c Excluded premature < 30 weeks.

^d Respiratory Distress Assessment Instrument score.

Table 3. Multivariable logistic regression analysis of risk factors for Intensive Care Unit treatment in children hospitalized with bronchiolitis.

Factors	ICU		OR	95%CI	P
	Yes n = 5	No n = 167			
Age (months) ^a	7.1 (4.1 – 6.8)	5.1 (1 – 23)	1.05	0.79 – 1.39	0.7
Severe malnutrition	2 (40%)	6 (3.6%)	21.53	1.43 – 323.66	0.03
Prematurity < 30 weeks	2 (40%)	4 (2.4%)	13.85	1.23 – 155.89	0.03
Duration of vomiting (days)^a	4 (3-5)	1 (1-2)	1.92	1.16 – 3.17	0.01

^a Median (IQR)

ICU, Intensive Care Unit; OR, odds ratio; CI, confidence interval

Table 4. Multivariable logistic regression analysis of risk factors for length of hospital stay ≥ 5 days in children hospitalized with bronchiolitis.

Factors	LOS ≥ 5 days		OR	95%CI	P
	Yes n = 69	No n = 103			
Age (months) ^a	5.0 (1.1 – 23.0)	5.3 (1.0 – 22.2)	0.92	0.85 – 1.01	0.07
Severe malnutrition	8 (11.6%)	0 (0%)	3030.55	0.0 – 2.227E+20	0.7
Prematurity (< 37 weeks)^b	17 (24.6%)	8 (7.8%)	3.89	1.55 – 9.79	0.004
Ongoing non-exclusive breastfeeding	22/68 (32.3%) ^c	51/99 (51.5%) ^c	0.56	0.28 – 1.15	0.1
Crackles	26 (37.7%)	22 (21.4%)	3.11	1.45 – 6.70	0.004

^a Median (IQR); LOS, length of hospital stay; OR, odds ratio; CI, confidence interval

^b Prematurity was included as 2 levels: < 30 weeks and 30 – 36 weeks of gestational age.

^c The total denominator was not 172 because there was missing information.