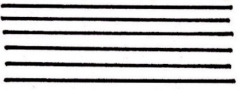
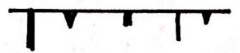
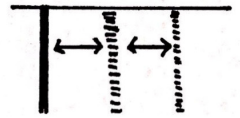
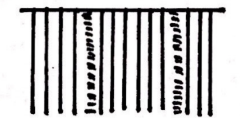
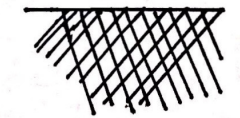
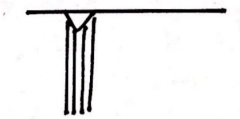



SUPPLEMENTARY MATERIAL

Supplementary Figure S1. Schematic classification of artifacts. We have classified artifacts into seven types. A-Lines identify the normal finding. A-lines are hyperechoic lines with run more or less horizontally across the ultrasound screen as replicas of the pleural line. They represent the normal pattern of the lung. The Short Vertical Artifacts (SVA) are vertical artifacts that lose their brightness before reaching the bottom of the screen, showing more or less rapid fading. They were not considered significant.

B-lines are defined as hyperechoic artifacts which originate at the pleura line and lie roughly perpendicular to the latter. Isolated B lines were not considered significant. Multiple B-lines are many B-lines in each scan. Multiple B lines were considered pathological findings. The white lung are completely white echo graphic lung field and no horizontal reverberation. It was considered an independent pathological finding. Consolidations were classified according to their linear size (greater superficial extension consolidation = < 1 cm or > 1 cm).

ULTRASOUND LUNG SEMIOLOGICAL CLASSIFICATION

A Lines	
Short Vertical Artefacts	
Isolated B Lines	
Multiple B Lines	
White lung	
Consolidation ≤ 1 cm	
Consolidation > 1 cm	

	ITALY CENTERS PARTECIPATING IN THE STUDY	Ultrasound Machine Used	CASES with 4 controls	CASES with a check	Excluded	Total cases	TOTAL CASES ENROLLED
1	Pediatric Unit, Valle del Serchio General Hospital, Barga, Lucca	Esaote My lab 50	19	11	0	30	30
2	Division of Pediatric and Neonatology Unit. Cecina Civil Hospital; Cecina, Livorno	Esaote My Lab six	28	1	4	33	29
3	Pediatric Unit, Moriggia Pelascini Hospital, Gravedona et Uniti, Como	Esaote My Lab Alpha	31	7	6	44	38
4	Department of Pediatrics, Lodi Hospital, Lodi	Aloka alfa 10, Vinno 6, Esaote Mylab	3	0	0	3	3
5	Unit of Pediatrics and Pediatric Emergency. Catania	Esaote Mylab Alpha	0	1	0	1	1
6	Division of Neonatology And Neonatal Intensive Care Unit. Pisa.	GE Vivid Iq	3	3	2	8	6
7	Department of Woman and Child Health and Public Health, Fondazione Policlinico Universitario A. Gemelli IRCCS, Rome	Esaote My lab40	44	8	1	53	52
8	Department of Pediatric Emergency, Bambin Gesù Children's Hospital IRCCS, Rome	Sonosite EDGE II	23	8	0	31	31
9	Pediatric and Pediatric Emergency Room Unit, Cannizzaro Emergency Hospital - Catania	GE Logiq, TWADP	11	7	5	23	18
10	Pediatric Emergency Unit, Sant'Orsola Hospital IRCCS, Bologna	Mindray DCT6	7	1	0	8	8

	ITALY CENTERS PARTECIPATING IN THE STUDY	Ultrasound Machine Used	CASES with 4 controls	CASES with a check	Excluded	Total cases	TOTAL CASES ENROLLED
11	Division of Pediatric and Neonatology Unit. Nottola Hospital, Montepulciano, Siena	Toshiba Xario 200	8	0	1	9	8
12	Pediatric Clinic, Department Of Surgical and Biomedical Sciences, University of Perugia, Perugia	Philips HD15, GE Vivid E95	8	1	0	9	9
Tot .			185	48	19	252	233

Supplemental Table S1. Italian centers participating in the study. 12 Italian centers with different degrees of intensity of care (1,2,3,level) participated in the study.

DICOTHOMOUS QUALITATIVE CLASSIFICATION: Positive ultrasound vs negative ultrasound (MODEL 1)	
Negative ultrasound	All 8 lung fields of an ultrasound are normal
Positive ultrasound	At least 1 lung field of 8 is not normal
DICOTHOMOUS QUALITATIVE CLASSIFICATION: Positive ultrasound vs negative ultrasound (MODEL 1)	
Negative field	Isolated or combined artifacts are present: A-SVA-IB
Positive field	There is at least one of the following artifacts: MB, WL, C, CC
QUALITATIVE OUTCOME OF THE ULTRASOUND (MODEL 2)	
Normal ultrasound	If all 8 fields are normal
Interstitial ultrasound	If at least 1 in 8 field is interstitial and the other normal
Consolidative ultrasound	If at least 1 field out of 8 is consolidative and the other normal
Mixed ultrasound	If present together an interstitial and/or consolidative and/or mixed field
QUALITATIVE OUTCOME OF THE ULTRASOUND (MODEL 2)	
Normal field	If isolated or combined artifacts are present: A-SVA-IB
Interstitial field	If any isolated or combined artifacts are present: MB-WL
Consolidative field	If isolated or combined artifacts are present: C-CC
Mixed field	If isolated or combined artifacts are present: MB-WL-C-CC
QUANTITIVE LUS score 0-32	
Ultrasound signs	SCORE GIVEN TO ULTRASOUND SIGNS
A lines	0
Short Vertical artifacts	1
Isolate B Lines	1
Multiple B Lines	2
White Lung	3
Consolidation = < 1cm	3

Consolidation > 1 cm	4
	For each ultrasound field explored in case of association of artifacts is the artifact with the highest score (e.g. WL+ IB= 3 and not 4)
QUANTITATIVE LUS score with cut off = 9	
Ultrasound score < = 9	Mild ultrasound
Ultrasound score > 9	Moderate-severe ultrasound

Supplementary Table S2 Definitions of adopted 2 qualitative models and 2 quantitative models score. ABBREVIATIONS: A: A lines; SVA: Short Vertical Artifacts; IB: Isolated B Lines; MB: Multiple B Lines; WL: White Lung; C: Consolidation = < 1 cm; CC: Consolidation > 1 cm.

Supplementary Table S3. The comparison between the AUC of the 2 qualitative models with-out and with the other LUS evidences

Models AUC comparisons	AUC Difference	p-value
Qualitative LUS model (positive/negative) - Qualitative LUS model (4-level model)	-0,054	0,027
Qualitative LUS model (positive/negative) - Quantitative LUS model (score)	-0,161	<0,001
Qualitative LUS model (positive/negative) - Quantitative LUS model (cutoff score >9)	-0,131	<0,001
Qualitative LUS model (positive/negative) - Qualitative LUS model (positive/negative)**	-0,138	<0,001
Qualitative LUS model (positive/negative) - Qualitative LUS model (4-level model)**	-0,144	<0,001
Qualitative LUS model (positive/negative) - Quantitative LUS model (score)**	-0,165	<0,001
Qualitative LUS model (positive/negative) - Quantitative LUS model (cutoff score >9)**	-0,156	<0,001
Qualitative LUS model (4-level model) - Quantitative LUS model (score)	-0,107	<0,001
Qualitative LUS model (4-level model) - Quantitative LUS model (cutoff score >9)	-0,076	0,006
Qualitative LUS model (4-level model) - Qualitative LUS model (positive/negative)**	-0,084	0,001
Qualitative LUS model (4-level model) - Qualitative LUS model (4-level model)**	-0,089	0,001
Qualitative LUS model (4-level model) - Quantitative LUS model (score)**	-0,111	<0,001
Qualitative LUS model (4-level model) - Quantitative LUS model (cutoff score >9)**	-0,101	<0,001
Quantitative LUS model (score) - Quantitative LUS model (cutoff score >9)	0,030	0,125
Quantitative LUS model (score) - Qualitative LUS model (positive/negative)**	0,023	0,158
Quantitative LUS model (score) - Qualitative LUS model (4-level model)**	0,017	0,264
Quantitative LUS model (score) - Quantitative LUS model (score)**	-0,004	0,377
Quantitative LUS model (score) - Quantitative LUS model (cutoff score >9)**	0,005	0,641
Quantitative LUS model (cutoff score >9) - Qualitative LUS model (positive/negative)**	-0,007	0,739
Quantitative LUS model (cutoff score >9) - Qualitative LUS model (4-level model)**	-0,013	0,557
Quantitative LUS model (cutoff score >9) - Quantitative LUS model (score)**	-0,035	0,079
Quantitative LUS model (cutoff score >9) - Quantitative LUS model (cutoff score >9)**	-0,025	0,150
Qualitative LUS model (positive/negative)** - Qualitative LUS model (4-level model)**	-0,006	0,294
Qualitative LUS model (positive/negative)** - Quantitative LUS model (score)**	-0,027	0,115
Qualitative LUS model (positive/negative)** - Quantitative LUS model (cutoff score >9)**	-0,018	0,027
Qualitative LUS model (4-level model)** - Quantitative LUS model (score)**	-0,022	0,199
Qualitative LUS model (4-level model)** - Quantitative LUS model (cutoff score >9)**	-0,012	0,147
Quantitative LUS model (score)** - Quantitative LUS model (cutoff score >9)**	0,010	0,466

LUNG ULTRASOUND MODELS		All cases n= 216	RSV positive n= 126	RSV negative n= 90	P values
Ultrasound positive vs negative	Ultrasound positive, n° (%)	170 (78.7)	101 (80.2)	69 (91,8)	0.537
	Ultrasound negative, n° (%)	46 (21.3)	25 (19.8)	21 (23.3)	
Qualitative result ultrasound	Normal, n° (%)	46 (21.3)	25 (19.8)	21 (23.3)	0.888
	Interstitial, n° (%)	15 (6.9)	9 (7.1)	6 (6.7)	
	Consolidative, n° (%)	53 (24.6)	30 (23.8)	23 (25.6)	
	Mixed n° (%)	102 (47.2)	62 (49.3)	40 (44.44)	
Score, mean (SD)		9.6 (5.2)	10.1 (5.6)	8.7 (4.5)	0.041
Score cut off > 9, n (%)	Yes, n° (%)	99 (45.8%)	68 (54.0%)	31 (34.4%)	0.005
	No, n° (%)	117 (54.2%)	58 (46.0%)	59 (65.6%)	

Supplementary Table S4 Comparison between bronchiolitis VRS +/.

Model	Variable		OR	95% CI		P value
Univariate models	Positive ultrasound	Yes	2,082	1,617	2,679	0,001
		No	1			
	Ultrasound result	Interstitial	1,950	1,496	2,542	0,001
		Consolidative	1,811	1,402	2,339	0,001
		Mixed	2,047	1,602	2,616	0,001
		Normal	1			
	Score		1,117	1,087	1,148	0,001
	Score > 9	Yes	3,291	2,467	4,391	0,001
		No	1			

MULTIVARIATE MODELS BASED ON QUALITATIVE LUS (positive vs negative) without or with other LUS variables (Early involvement of paravertebral lung fields and extension)

MULTIVARIATE ANALYSES USING DIFFERENT LUS MODELS

Positive ultrasound	Yes	1,945	1,054	3,587	0,033
	No	1			
Early involvement of lung fields	Yes	2,609	1,316	5,172	0,006
	No	1			
Number of fields involved		1,285	1,167	1,416	0,000

MULTIVARIATE ANALYSES USING DIFFERENT LUS MODELS

MULTIVARIATE MODELS BASED ON QUALITATIVE LUS (type of lung disease) without or with other LUS variables (Early involvement of paravertebral lung fields and extension)

Ultrasound result	Interstitial	2,066	1,077	3,962	0,029
	Consolidative	1,850	0,982	3,483	0,057

	Mixed	1,906	1,003	3,624	0,049
	Normal	1			
Early involvement of lung fields	Yes	2,704	1,364	5,362	0,004
	No	1			
Number of fields involved		1,271	1,150	1,403	0,000
MULTIVARIATE MODELS BASED ON QUANTITATIVE LUS (mean score) without or with other LUS variables (Early involvement of paravertebral lung fields and extension)					
Score		1,119	1,085	1,153	0,000
Early involvement of lung fields	Yes	2,444 2	1,245	4,788	0,009
	No	1			
MULTIVARIATE MODELS BASED ON QUANTITATIVE LUS (score >9) without or with other LUS variables (Early involvement of paravertebral lung fields and extension)					
Score >9	Yes	2,605	1,694	4,005	0,000
	No	1			
Early involvement of lung fields	Yes	2,366	1,177	4,755	0,016
	No	1			
Number of fields involved		1,158	1,042	1,286	0,006

Table S5. Multivariate analyses correlating LUS and bronchiolitis severity at last follow-up.

		T0			T1			T2			T3			P Value
		CAS ES (n=185)	Mild bronc hilitis (n=129), 69,7%	Moderate/severe Bronchi olitis (n=56), 30,3%	CAS I (n=185)	Mild bronc hilitis (n=136), 73,5%	Moderate/severe Bronchio litis (n=49), 26,5%	CAS ES (n=185)	Mild Bronchi olitis (n=152), 82,2%	Moderate/severe Bronchi olitis (n=33), 17,8%	CAS ES (n=185)	Mild bronc hilitis (n=177), 95,7%	Moderate/severe Bronchi olitis (n=8), 4,3%	0,000
THERAPY	Oxygen	62 (33,5%)	19 (14,7%)	43 (76,8%)	71 (38,4%)	25 (18,4%)	46 (93,9%)	71(0,384%)	43 (0,283%)	28 (0,848%)	39 (0,211%)	31 (0,175%)	8 (1%)	0,005
	Antibiotics	62 (33,5%)	36(27,9%)	26 (46,4%)	68 (36,8%)	40 (29,4%)	26 (57,1%)	69 (0,373%)	48 (0,316%)	21 (0,636%)	57 (0,308%)	57 (0,294%)	5 (0,625%)	0,441
	Hypertonic solution	80 (43,2%)	57 (44,2%)	23 (41,1%)	77 (41,6%)	58 (46,2%)	19 (38,8%)	79 (0,472%)	62 (0,408%)	17 (0,515%)	71 (0,384%)	68 (0,384%)	3 (0,375%)	0,022
	Broncodilators	68 (36,8%)	41 (31,8%)	27 (48,2%)	70 (37,8%)	47 (34,6%)	23 (46,9%)	74 (40%)	62 (40,8%)	12 (36,4%)	57 (30,8%)	51 (28,8%)	6 (75%)	0,035
	Steroids	73 (39,5%)	42 (32,6%)	31 (55,4%)	73 (39,5%)	47 (34,6%)	26 (53,1%)	73 (39,5%)	59 (38,8%)	14 (42,4%)	53 (28,6%)	47 (26,6%)	6 (75%)	0,002
	Adrenaline	3 (1,6%)	0	3 (5,4%)	3 (1,6%)	0	3 (6,1%)	2 (11%)	0	2 (6,1%)	1 (0,5%)	1 (0,6%)	0	0,625
	HFNC	37 (20%)	12 (9,3%)	35 (44,6%)	39 (21,1%)	16 (11,8%)	23 (46,9%)	29 (15,7%)	16 (10,5)	13 (39,4%)	13 (7%)	9 (5,1%)	4 (50%)	< 0,001
	nCPAP	2 (1,1%)	0 (2 (3,6%)	7 (3,8%)	0	7 (14,3%)	7 (3,8%)	4 (2,6%)	3 (9,1%)	2 (1,1%)	1 (0,6%)	1 (12,5%)	1
	Invasive Ventilation	0	0	0	0	0	0	0	0	0	0	0	0	

Table S6 Changes in treatments offered. HFNC: high flow nasal cannulae. nCPAP: nasal Continuous Positive Airway Pressure