

PEDIATRIC CORONAVIRUS DISEASE 2019: HOW TO ASSESS CHEST DISEASE?

Journal:	<i>Pediatric Pulmonology</i>
Manuscript ID	PPUL-20-0439.R1
Wiley - Manuscript type:	Letters to the Editor
Date Submitted by the Author:	n/a
Complete List of Authors:	Corcione, Adele; Federico II University Hospital Annunziata, Federica; Federico II University Borrelli, Melissa; Federico II University, Department of Translational Medical Sciences - Section of Pediatrics Santamaria, Francesca; Federico II University, Department of Translational Medical Sciences - Section of Pediatrics
Keywords:	Imaging, Lung Pathology, Pulmonology (general), International Health
Other Keywords:	COVID-19, SARS-CoV-2, children, lung involvement, imaging techniques
Abstract:	<p>The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has emerged as a serious health problem worldwide. In the pediatric population, currently available epidemiological data seem reassuring as the incidence of coronavirus disease 2019 (COVID-19) is much lower than in adults, with less critical cases and very few deaths.</p> <p>At present, there are no evidence-based studies on chest imaging in pediatric COVID-19. Chest X-rays showed non-specific findings and chest computed tomography (CT) exhibited similar, but fairly less severe CT changes compared to adult. Moreover, in approximately 50% of pediatric patients no correlation was found between chest CT imaging results and clinical characteristics. Lung ultrasound is rarely used, despite its unquestionable benefits as it can be performed at bed-side with a portable device, which minimizes virus transmission, is cheap and can be easily repeated. In conclusion, the chest imaging use in children, who are typically spared from severe infection, deserve recommendations different than adults also considering the increased risk of radiations exposure. In view of this, pediatric comparative studies among different chest imaging techniques, either less or more invasive, are urgently needed possibly after standardization of interpretation criteria of lung ultrasound.</p>

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Table. Summary of abnormal chest imaging in children with COVID-19.

Investigations	Abnormal findings
Conventional Chest X-rays	Increased markings Uni/bilateral consolidations Pleural effusion “White lung-like” changes
Chest Computed Tomography	Patchy shadows Ground Glass Opacities Consolidations with halo sign Tiny nodules Diffuse consolidations
Lung ultrasound	Interstitial syndrome Small sub-pleural consolidations

1
2
3
4
5
6
7
8
9

~~THE TITLE OF THE COVER SHEET OF THE DOCUMENT IS: PEDIATRIC CORONAVIRUS DISEASE 2019: HOW TO ASSESS CHEST DISEASE?~~

PEDIATRIC CORONAVIRUS DISEASE 2019: HOW TO ASSESS CHEST DISEASE?

10
11
12
13
14
15

**Adele Corcione[#], M.D., Federica Annunziata[#], M.D., Melissa Borrelli, M.D., Ph.D., and
Francesca Santamaria, M.D.**

16
17

[#] Shared first authorship

18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36

Department of Translational Medical Sciences, Section of Pediatrics, Federico II University,
Naples, Italy.

37
38

Correspondence to:

39
40

Prof. Francesca Santamaria

41
42

Department of Translational Medical Sciences

43
44

Federico II University, Via Pansini 5, 80131, Naples, Italy.

45
46

Telephone: +39 081 7463495

47
48
49
50
51
52
53
54
55
56
57
58
59
60

E-mail address: santamar@unina.it

1
2
3 **Key words:** COVID-19, SARS-CoV-2, children, adolescents, lung involvement, imaging
4
5 techniques.
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

For Peer Review

Abstract

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has emerged as a serious health problem worldwide. In the pediatric population, currently available epidemiological data seem reassuring as the incidence of coronavirus disease 2019 (COVID-19) is much lower than in adults, with less critical cases and very few deaths.

At present, there are no evidence-based studies on chest imaging in pediatric COVID-19. Chest X-rays showed non-specific findings and chest computed tomography (CT) exhibited similar, but fairly less severe CT changes compared to adult. Moreover, in approximately 50% of pediatric patients no correlation was found between chest CT imaging results and clinical characteristics. Lung ultrasound is rarely used, despite its unquestionable benefits as it can be performed at bed-side with a portable device, which minimizes virus transmission, is cheap and can be easily repeated. In conclusion, the chest imaging use in children, who are typically spared from severe infection, deserve recommendations different than adults also considering the increased risk of radiations exposure. In view of this, pediatric comparative studies among different chest imaging techniques, either less or more invasive, are urgently needed possibly after standardization of interpretation criteria of lung ultrasound.

To the Editor,

The number of cases with coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is dramatically increasing, with high fatality rate. The medical community has mixed feelings about pediatric COVID-19. On the one hand, the epidemiologic reports seem reassuring as retrospective data show that most children have mild disease or are asymptomatic, there are fairly less critical cases than adults and few deaths. In Italy, of all infected, 1.9% had less than 19 years, with 0.1% mortality rate (99.9% among adults)¹. On the other hand, despite the bulk of publications, many aspects of pediatric COVID-19 are blurry, and in particular how evaluating pulmonary involvement in children infected from SARS-CoV-2 is not completely defined. In a recent issue of *Pediatric Pulmonology*, Zhu *et al* from China reported the clinical characteristics of a case series of 10 children or adolescents with COVID-19 who were admitted with fever (40%) or cough (30%) or headache (20%), and no fatigue or shortness of breath². Thirty percent were asymptomatic. All had normal white blood cells or acute phase reactants. In all cases, chest imaging included computed tomography (CT), but not conventional X-rays (CXR) or lung ultrasound (US). Five out of 10 cases had negative CT, although fever and/or cough were present in 3 children, while bilateral or unilateral ground-glass opacities (GGO) were detected in the remaining 5 patients, either in the absence or presence of symptoms (2 and 3 cases, respectively). These data prompted us to some considerations on the use of chest imaging in children with confirmed COVID-19 requiring lung disease assessment.

At present, there are no evidence-based studies on chest imaging in pediatric COVID-19. Some authors from China reported that either in the presence or absence of symptoms, CXR findings may be non-specific, and that chest CT might support information in early disease³. Compared to adults, children exhibited similar, but fairly less severe CT changes,

1
2
3 ranging from no anomalies at all (20-65%) to unilateral (21-30%) or bilateral (10-50%) changes,
4
5 with predominantly sub-pleural distribution³. Typical findings are patchy shadows, ground-glass
6
7 opacities (GGO), consolidations with halo sign and tiny nodules^{2,3}. More diffuse CT changes,
8
9 including bilateral consolidations may be observed in children with co-infections, in those aged
10
11 less <3 years or requiring intensive care³. In inpatients, chest CT may also be used to follow
12
13 the evolution of lung changes and assess the recovery of abnormalities, or progression of
14
15 consolidations into GGO, or residual fibrotic bands. However, the demonstration of either GGO
16
17 in the absence of symptoms, or of normal CT in children with mild symptoms, raises doubts on
18
19 use of CT in pediatric COVID-19².

20
21
22
23
24 Actually, the British Paediatric Respiratory Society recommended not to perform any
25
26 chest imaging routinely in children, even in those who require little supplemental oxygen on
27
28 admission⁴. Conversely, a China document advised that suspected or confirmed cases should
29
30 undertake chest X-ray examination as soon as possible³. The British Paediatric Respiratory
31
32 Society recommended that chest X-rays, possibly with a portable device, is done only in
33
34 children requiring prolonged oxygen on day 3 of admission or non-invasive ventilation, or if
35
36 there is a specific clinical question⁴. For avoiding excessive radiation exposure and
37
38 contamination of suites, personnel and equipment, chest CT should be reserved to unstable
39
40 cases with increasingly clinical deterioration, or if surgery cannot be postponed. In light of this,
41
42 using US as radiation-free alternative seems interesting, also taking into account the
43
44 predilection for the disease in the subpleural regions.

45
46
47
48
49 In a large pediatric COVID-19 population from Italy, the imaging technique of choice was
50
51 CXR (obtained in 35% of cases), chest CT was not performed, and bedside LUS, done only if
52
53 an expert sonographer was available, was done in 10% of the cases as alternative option to
54
55 CXR or to confirm negative CXR despite severe symptoms⁵. Of all patients, 21% were

1
2
3 asymptomatic, and 58%, 20%, and 1% had mild or moderate-to-severe or critical COVID-19,
4
5 respectively. Eleven children showed lung involvement at CXR or US in the absence of hypoxia,
6
7 likely because of early hospital admission. Although it cannot be ruled-out that the definition of
8
9 moderate-to-severe disease in 20% of cases was achieved because CXR, and not CT was
10
11 used, actually CT may overestimate the impact of chest-associated pediatric COVID-19, yet
12
13 excessive use of radiation should prompt to search for alternate, less invasive techniques as
14
15 demonstrated in pediatric lung disorders⁶. Benefits of lung US in pediatric COVID-19 are
16
17 unquestionable as it can be performed at bed-side with a portable device, which minimizes
18
19 virus transmission, is cheap and can be repeated. Though, the availability of experts, as well
20
21 the absence of standardized interpretation criteria, greatly limits its routine application.
22
23
24
25

26
27 Currently, no recommendations are available on the chest imaging techniques of choice
28
29 in the assessment of lung disease in pediatric COVID-19. The **Table** summarizes the chest
30
31 imaging findings from pediatric studies.
32

33
34 Actually, children and adolescents, who are typically spared from severe infection,
35
36 deserve recommendations different than adults, with special consideration to the risk of
37
38 radiations exposure which is significantly increased among children. In view of this, pediatric
39
40 comparative studies among different chest imaging techniques, either less or more invasive,
41
42 are urgently needed in pediatric COVID-19, possibly after standardization of interpretation
43
44 criteria (for instance, for US). As residual lung fibrosis may develop after viral infections also in
45
46 children with COVID-19, a longitudinal follow-up study with invasive or less invasive imaging
47
48 techniques would be of remarkable value. Finally, chest imaging findings might also be used
49
50 as measure of efficacy of old or novel therapies in adult as well in pediatric COVID-19.
51
52
53
54
55
56
57
58
59
60

1
2
3 There is an urgent need to understand several issues of pediatric COVID-19. First and
4
5 foremost, while waiting for vaccine, no one should lower the guard in preventing the spreading
6
7 of the virus from asymptomatic or presymptomatic children, reducing the proportion of those
8
9 infected, providing them with the best management also including imaging techniques for lung
10
11 disease extension and severity evaluation, and thus keeping under control the increase of
12
13 cases and deaths from this outbreak, likely the most dramatic ever lived by humans over the
14
15 last century. We wish that our observations prompt further investigation into the assessment of
16
17 lung disease in children with COVID-19.
18
19
20
21
22

23 **References**

- 24
25 1. Istituto Superiore di Sanità. Sorveglianza Integrata COVID-19 in Italia. Available from:
26 https://www.epicentro.iss.it/coronavirus/bollettino/Infografica_4 (Accessed on May 5, 2020)
27
28
- 29
30 2. Zhu L, Wang J, Huang R, Liu L, Zhao H, Wu C, Zhu C. Clinical characteristics of a case
31 series of children with coronavirus disease 2019. *Pediatr Pulmonol.* 2020;1–3.
32
33
- 34
35 3. Shen K, Yang Y, Wang T, Zhao D, Jiang Y, Jin R, Zheng Y, Xu B, Xie Z, Lin L, et al.
36 Diagnosis, treatment, and prevention of 2019 novel coronavirus infection in children:
37 experts' consensus statement. *World J Pediatr.* 2020 Feb 7. doi: 10.1007/s12519-020-
38 00343-7. [Epub ahead of print]
39
40
41
- 42
43 4. British Paediatric Respiratory Society. Management of children admitted to hospital with
44 COVID-19 infection (Version 2). Available from: [https://www.rcpch.ac.uk/resources/covid-
45 19-guidance-paediatric-services](https://www.rcpch.ac.uk/resources/covid-19-guidance-paediatric-services) (Accessed on May 5, 2020).
46
47
- 48
49 5. Parri N, Lenge M, Buonsenso D. Coronavirus Infection in Pediatric Emergency
50 Departments (CONFIDENCE) Research Group. Children with Covid-19 in Pediatric
51 Emergency Departments in Italy. *N Engl J Med.* 2020 May 1. doi: 10.1056/NEJMc2007617.
52 Online ahead of print.
53
54
55
56
57
58
59
60

- 1
2
3 6. Montella S, Maglione M, Bruzzese D, Mollica C, Pignata C, Aloj G, Manna A, Esposito A,
4 Mirra V, Santamaria F. Magnetic resonance imaging is an accurate and reliable method to
5 evaluate non-cystic fibrosis paediatric lung disease. *Respirology*. 2012;17(1): 87-91.
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

For Peer Review

1
2
3
4
5
6
7
8
9

~~THE JOURNAL OF THE AMERICAN COLLEGE OF CHEST PHYSICIANS, VOL. 47, NO. 1, P. 1-10 (2019)~~

PEDIATRIC CORONAVIRUS DISEASE 2019: HOW TO ASSESS CHEST DISEASE?

10
11
12
13
14
15

**Adele Corcione[#], M.D., Federica Annunziata[#], M.D., Melissa Borrelli, M.D., Ph.D., and
Francesca Santamaria, M.D.**

16
17

[#] Shared first authorship

18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36

Department of Translational Medical Sciences, Section of Pediatrics, Federico II University,
Naples, Italy.

37
38

Correspondence to:

39
40

Prof. Francesca Santamaria

41
42

Department of Translational Medical Sciences

43
44

Federico II University, Via Pansini 5, 80131, Naples, Italy.

45
46

Telephone: +39 081 7463495

47
48
49
50
51
52
53
54
55
56
57
58
59
60

E-mail address: santamar@unina.it

1
2
3 **Key words:** COVID-19, SARS-CoV-2, children, adolescents, lung involvement, imaging
4
5 techniques.
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

For Peer Review

Abstract

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has emerged as a serious health problem worldwide. In the pediatric population, currently available epidemiological data seem reassuring as the incidence of coronavirus disease 2019 (COVID-19) is much lower than in adults, with less critical cases and very few deaths.

At present, there are no evidence-based studies on chest imaging in pediatric COVID-19. Chest X-rays showed non-specific findings and chest computed tomography (CT) exhibited similar, but fairly less severe CT changes compared to adult. Moreover, in approximately 50% of pediatric patients no correlation was found between chest CT imaging results and clinical characteristics. Lung ultrasound is rarely used, despite its unquestionable benefits as it can be performed at bed-side with a portable device, which minimizes virus transmission, is cheap and can be easily repeated. In conclusion, the chest imaging use in children, who are typically spared from severe infection, deserve recommendations different than adults also considering the increased risk of radiations exposure. In view of this, pediatric comparative studies among different chest imaging techniques, either less or more invasive, are urgently needed possibly after standardization of interpretation criteria of lung ultrasound.

To the Editor,

The number of cases with coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is dramatically increasing, with high fatality rate. The medical community has mixed feelings about pediatric COVID-19. On the one hand, the epidemiologic reports seem reassuring as retrospective data show that most children have mild disease or are asymptomatic, there are fairly less critical cases than adults and few deaths. In Italy, of all infected, 1.9% had less than 19 years, with 0.1% mortality rate (99.9% among adults)¹. On the other hand, despite the bulk of publications, many aspects of pediatric COVID-19 are blurry, and in particular how evaluating pulmonary involvement in children infected from SARS-CoV-2 is not completely defined. In a recent issue of *Pediatric Pulmonology*, Zhu *et al* from China reported the clinical characteristics of a case series of 10 children or adolescents with COVID-19 who were admitted with fever (40%) or cough (30%) or headache (20%), and no fatigue or shortness of breath². Thirty percent were asymptomatic. All had normal white blood cells or acute phase reactants. In all cases, chest imaging included computed tomography (CT), but not conventional X-rays (CXR) or lung ultrasound (US). Five out of 10 cases had negative CT, although fever and/or cough were present in 3 children, while bilateral or unilateral ground-glass opacities (GGO) were detected in the remaining 5 patients, either in the absence or presence of symptoms (2 and 3 cases, respectively). These data prompted us to some considerations on the use of chest imaging in children with confirmed COVID-19 requiring lung disease assessment.

At present, there are no evidence-based studies on chest imaging in pediatric COVID-19. Some authors from China reported that either in the presence or absence of symptoms, CXR findings may be non-specific, and that chest CT might support information in early disease³. Compared to adults, children exhibited similar, but fairly less severe CT changes,

1
2
3 ranging from no anomalies at all (20-65%) to unilateral (21-30%) or bilateral (10-50%) changes,
4
5 with predominantly sub-pleural distribution³. Typical findings are patchy shadows, ground-glass
6
7 opacities (GGO), consolidations with halo sign and tiny nodules^{2,3}. More diffuse CT changes,
8
9 including bilateral consolidations may be observed in children with co-infections, in those aged
10
11 less <3 years or requiring intensive care³. In inpatients, chest CT may also be used to follow
12
13 the evolution of lung changes and assess the recovery of abnormalities, or progression of
14
15 consolidations into GGO, or residual fibrotic bands. However, the demonstration of either GGO
16
17 in the absence of symptoms, or of normal CT in children with mild symptoms, raises doubts on
18
19 use of CT in pediatric COVID-19².

20
21
22
23
24 Actually, the British Paediatric Respiratory Society recommended not to perform any
25
26 chest imaging routinely in children, even in those who require little supplemental oxygen on
27
28 admission⁴. Conversely, a China document advised that suspected or confirmed cases should
29
30 undertake chest X-ray examination as soon as possible³. The British Paediatric Respiratory
31
32 Society recommended that chest X-rays, possibly with a portable device, is done only in
33
34 children requiring prolonged oxygen on day 3 of admission or non-invasive ventilation, or if
35
36 there is a specific clinical question⁴. For avoiding excessive radiation exposure and
37
38 contamination of suites, personnel and equipment, chest CT should be reserved to unstable
39
40 cases with increasingly clinical deterioration, or if surgery cannot be postponed. In light of this,
41
42 using US as radiation-free alternative seems interesting, also taking into account the
43
44 predilection for the disease in the subpleural regions.

45
46
47
48
49 In a large pediatric COVID-19 population from Italy, the imaging technique of choice was
50
51 CXR (obtained in 35% of cases), chest CT was not performed, and bedside LUS, done only if
52
53 an expert sonographer was available, was done in 10% of the cases as alternative option to
54
55 CXR or to confirm negative CXR despite severe symptoms⁵. Of all patients, 21% were

1
2
3 asymptomatic, and 58%, 20%, and 1% had mild or moderate-to-severe or critical COVID-19,
4
5 respectively. Eleven children showed lung involvement at CXR or US in the absence of hypoxia,
6
7 likely because of early hospital admission. Although it cannot be ruled-out that the definition of
8
9 moderate-to-severe disease in 20% of cases was achieved because CXR, and not CT was
10
11 used, actually CT may overestimate the impact of chest-associated pediatric COVID-19, yet
12
13 excessive use of radiation should prompt to search for alternate, less invasive techniques as
14
15 demonstrated in pediatric lung disorders⁶. Benefits of lung US in pediatric COVID-19 are
16
17 unquestionable as it can be performed at bed-side with a portable device, which minimizes
18
19 virus transmission, is cheap and can be repeated. Though, the availability of experts, as well
20
21 the absence of standardized interpretation criteria, greatly limits its routine application.
22
23
24
25

26
27 Currently, no recommendations are available on the chest imaging techniques of choice
28
29 in the assessment of lung disease in pediatric COVID-19. The **Table** summarizes the chest
30
31 imaging findings from pediatric studies.
32

33
34 Actually, children and adolescents, who are typically spared from severe infection,
35
36 deserve recommendations different than adults, with special consideration to the risk of
37
38 radiations exposure which is significantly increased among children. In view of this, pediatric
39
40 comparative studies among different chest imaging techniques, either less or more invasive,
41
42 are urgently needed in pediatric COVID-19, possibly after standardization of interpretation
43
44 criteria (for instance, for US). As residual lung fibrosis may develop after viral infections also in
45
46 children with COVID-19, a longitudinal follow-up study with invasive or less invasive imaging
47
48 techniques would be of remarkable value. Finally, chest imaging findings might also be used
49
50 as measure of efficacy of old or novel therapies in adult as well in pediatric COVID-19.
51
52
53
54
55
56
57
58
59
60

1
2
3 There is an urgent need to understand several issues of pediatric COVID-19. First and
4
5 foremost, while waiting for vaccine, no one should lower the guard in preventing the spreading
6
7 of the virus from asymptomatic or presymptomatic children, reducing the proportion of those
8
9 infected, providing them with the best management also including imaging techniques for lung
10
11 disease extension and severity evaluation, and thus keeping under control the increase of
12
13 cases and deaths from this outbreak, likely the most dramatic ever lived by humans over the
14
15 last century. **We wish that our observations prompt further investigation into the assessment of**
16
17 **lung disease in children with COVID-19.**
18
19
20
21
22

23 **References**

- 24
25 1. Istituto Superiore di Sanità. Sorveglianza Integrata COVID-19 in Italia. Available from:
26 https://www.epicentro.iss.it/coronavirus/bollettino/Infografica_4 (Accessed on May 5, 2020)
27
28
- 29
30 2. Zhu L, Wang J, Huang R, Liu L, Zhao H, Wu C, Zhu C. Clinical characteristics of a case
31 series of children with coronavirus disease 2019. *Pediatr Pulmonol.* 2020;1–3.
32
33
- 34
35 3. Shen K, Yang Y, Wang T, Zhao D, Jiang Y, Jin R, Zheng Y, Xu B, Xie Z, Lin L, et al.
36 Diagnosis, treatment, and prevention of 2019 novel coronavirus infection in children:
37 experts' consensus statement. *World J Pediatr.* 2020 Feb 7. doi: 10.1007/s12519-020-
38 00343-7. [Epub ahead of print]
39
40
41
- 42
43 4. British Paediatric Respiratory Society. Management of children admitted to hospital with
44 COVID-19 infection (Version 2). Available from: [https://www.rcpch.ac.uk/resources/covid-
45 19-guidance-paediatric-services](https://www.rcpch.ac.uk/resources/covid-19-guidance-paediatric-services) (Accessed on May 5, 2020).
46
47
- 48
49 5. Parri N, Lenge M, Buonsenso D. Coronavirus Infection in Pediatric Emergency
50 Departments (CONFIDENCE) Research Group. Children with Covid-19 in Pediatric
51 Emergency Departments in Italy. *N Engl J Med.* 2020 May 1. doi: 10.1056/NEJMc2007617.
52
53 Online ahead of print.
54
55
56
57
58
59
60

- 1
2
3 6. Montella S, Maglione M, Bruzzese D, Mollica C, Pignata C, Aloj G, Manna A, Esposito A,
4 Mirra V, Santamaria F. Magnetic resonance imaging is an accurate and reliable method to
5 evaluate non-cystic fibrosis paediatric lung disease. *Respirology*. 2012;17(1): 87-91.
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

For Peer Review

1
2
3 May 2020
4
5

6
7 RE: PPUL-20-0439.R1
8
9

10 PEDIATRIC CORONAVIRUS DISEASE 2019: HOW TO ASSESS CHEST DISEASE?

11
12 **Adele Corcione, M.D., Federica Annunziata, M.D., Melissa Borrelli, M.D., Ph.D., and**
13
14
15 **Francesca Santamaria, M.D.**
16

17 Dear Editor,
18

19 we thank you and reviewer very much for the positive comments and for accepting our paper.
20
21

22
23 Reviewer: 1

24 Comments to the Author

25 The authors have provided valuable comparative observations from the front lines in their experience
26 of evaluating lung disease in Pediatric patients with COVID19. Their observations should prompt
27 further investigation into the assessment of lung disease in children.
28
29

30 *We thank the reviewer for his valuable comment. Accordingly, we added a sentence at the end of the*
31 *last paragraph, page 6, i.e.: "We wish that our observations prompt further investigation into the*
32 *assessment of lung disease in children with COVID-19*
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60