

## Supplementary Online Content

Maw AM, Hassanin A, Ho PM, et al. Diagnostic accuracy of point-of-care lung ultrasonography and chest radiography in adults with symptoms suggestive of acute decompensated heart failure: a systematic review and meta-analysis. *JAMA Netw Open*. 2019;2(3):e190703. doi:10.1001/jamanetworkopen.2019.0703

**eTable 1.** Search Strategies

**eTable 2.** QUADAS-2 Assessment of Methodologic Quality of Included Studies

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This supplementary material has been provided by the authors to give readers additional information about their work.

**eTable 1. Search Strategies**

MEDLINE – search date 5/25/2018

#	Search terms	Results
1	exp Radiography, Thoracic/	36897
2	((chest or lung* or thora* or pulm*) adj4 (xray* or x-ray* or radiograph* or radiogram* or radiolog* or roentgen*)).mp.	80300
3	1 or 2	85152
4	exp Ultrasonography/	396639
5	((chest or lung* or thora* or pulm*) adj4 (sonogra* or ultrasound* or ultrasonic* or ultrasonogra* or ultra-sound* or ultra-sonic* or ultra-sonogra*)).mp.	4769
6	4 or 5	398844
7	exp Pulmonary Edema/	16605
8	((pulm* or lung* or cardiogenic) adj3 (edema* or oedema*)).mp.	26690
9	exp Extravascular Lung Water/	1111
10	((extravascular or extra-vascular ) adj3 (pulm* or lung*) adj3 (water or fluid)).mp.	2188
11	wet lung.mp.	374
12	exp Heart Failure/	107511
13	((heart or cardiac) adj3 failure).mp.	189262
14	((preserved or reduced) adj3 ejection fraction).mp.	6738
15	interstitial syndrome.mp.	157
16	or/7-15	217154
17	3 and 6 and 16	783

Embase – search date 5/25/2018

#	Search terms	Results
1	'thorax radiography'/exp	164461
2	((chest or lung* or thora* or pulm*) NEAR/4 (xray* or x-ray* or radiograph* or radiogram* or radiolog* or roentgen*)):ab,ti	85116
3	#1 or #2	198228
4	'ultrasound'/exp	157205
5	((chest or lung* or thora* or pulm*) NEAR/4 (sonogra* or ultrasound* or ultrasonic* or ultrasonogra* or ultra-sound* or ultra-sonic* or ultra-sonogra*)):ab,ti	7491
6	#4 or #5	162337
7	'lung edema'/exp	39908
8	((pulm* or lung* or cardiogenic) NEAR/3 (edema* or oedema*)):ab,ti	27566
9	'lung extravascular fluid'/exp	1520
10	((extravascular or extra-vascular ) NEAR/3 (pulm* or lung*) NEAR/3 (water or fluid )):ab,ti	2174
11	wet lung':ab,ti	458
12	'heart failure'/exp	440404
13	((heart or cardiac) NEAR/3 failure):ab,ti	248419
14	((preserved or reduced) NEAR/3 'ejection fraction'):ab,ti	13920
15	interstitial syndrome':ab,ti	226
16	#7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15	525423
17	#3 and #6 and #16	662

#	Search terms	Results
1	MeSH descriptor: [Radiography, Thoracic] explode all trees	414
2	(chest or lung* or thora* or pulm*) near/4 (xray* or x-ray* or radiograph* or radiogram* or radiolog* or roentgen*):ti,ab,kw (Word variations have been searched)	3008
3	#1 or #2	3027
4	MeSH descriptor: [Ultrasonography] explode all trees	13757
5	(chest or lung* or thora* or pulm*) near/4 (sonogra* or ultrasound* or ultrasonic* or ultrasonogra* or ultra-sound* or ultra-sonic* or ultra-sonogra*):ti,ab,kw (Word variations have been searched)	489
6	#4 or #5	14125
7	MeSH descriptor: [Pulmonary Edema] explode all trees	220
8	(pulm* or lung* or cardiogenic) near/3 (edema* or oedema*):ti,ab,kw (Word variations have been searched)	1062
9	MeSH descriptor: [Extravascular Lung Water] explode all trees	57
10	(extravascular or extra-vascular) near/3 (pulm* or lung*) near/3 (water or fluid):ti,ab,kw (Word variations have been searched)	196
11	"wet lung":ti,ab,kw (Word variations have been searched)	5
12	MeSH descriptor: [Heart Failure] explode all trees	7251
13	(heart or cardiac) near/3 failure:ti,ab,kw (Word variations have been searched)	20181
14	(preserved or reduced) near/3 "ejection fraction":ti,ab,kw (Word variations have been searched)	1344
15	"interstitial syndrome":ti,ab,kw (Word variations have been searched)	8
16	#7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15	21381
17	#3 and #6 and #16	41

#	Search terms	Results
1	TS=((chest or lung* or thora* or pulm*) NEAR/4 (xray* or x-ray* or radiograph* or radiogram* or radiolog* or roentgen*))	35350
2	TS=((chest or lung* or thora* or pulm*) NEAR/4 (sonogra* or ultrasound* or ultrasonic* or ultrasonogra* or ultra-sound* or ultra-sonic* or ultra-sonogra*))	5057
3	TS=((pulm* or lung* or cardiogenic) NEAR/3 (edema* or oedema*))	17812
4	TS=((extravascular or extra-vascular ) NEAR/3 (pulm* or lung*) NEAR/3 (water or fluid ))	1552
5	TS=("wet lung")	187
6	TS=((heart or cardiac) NEAR/3 failure)	215213
7	TS=((preserved or reduced)NEAR/3 "ejection fraction")	9856
8	TS=("interstitial syndrome")	215
9	#3 or #4 or #5 or #6 or #7 or #8	233998

### Additional grey literature

ClinicalTrials.gov (searched 5/18/2017) –

- "Lung Ultrasound for Acute Dyspnea in Emergency Department"  
<https://clinicaltrials.gov/ct2/show/NCT01287429>
- "Diagnostic Value of Portable Ultrasound for Dyspneic Patient Support in the Emergency Department (VSCAN-DYSP)" <https://clinicaltrials.gov/ct2/show/NCT01818882>
- "Comparison Between Lung Ultrasound and Chest Radiography for Acute Dyspnea"  
<https://clinicaltrials.gov/ct2/show/NCT02105207>
- "Evaluation of the Impact of the Use of Pulmonary and Diaphragmatic Ultrasound the Clinical Decision-making in Respiratory Physiotherapy in Patients in ICU (USADEPT)"  
<https://clinicaltrials.gov/ct2/show/NCT02881814>
- "The Role of Lung Ultrasound During Perioperative Evaluation"  
<https://clinicaltrials.gov/ct2/show/NCT03111641>

ProQuest Dissertations and Theses (searched 5/18/2017) – 137 results, but 0 relevant: (((chest OR lung\* OR thora\* OR pulm\*) NEAR/4 (xray\* OR x-ray\* OR radiograph\* OR radiogram\* OR radiolog\* OR roentgen\*))) AND (((chest OR lung\* OR thora\* OR pulm\*) NEAR/4 (sonogra\* OR ultrasound\* OR ultrasonic\* OR ultrasonogra\* OR ultra-sound\* OR ultra-sonic\* OR ultra-sonogra\*))) AND (((pulm\* OR lung\* OR cardiogenic) NEAR/3 (edema\* OR oedema\*)) OR ((heart OR cardiac) NEAR/3 (failure)) OR ((extravascular or extra-vascular) NEAR/3 (pulm\* or

lung\*) NEAR/3 (water or fluid)) OR wet lung OR interstitial syndrome OR ((preserved or reduced) NEAR/3 ))

**eTable 2.** QUADAS-2 Assessment of Methodologic Quality of Included Studies

Risk of Bias						Applicability Concerns			
Study	Patient selection	Index test (LUS)	Index test (CXR)	Reference standard	Flow and timing	Patient Selection	Index Test (LUS)	Index Test (CXR)	Criterion Standard
Baker et al. <sup>35</sup>	High	Low	Low	High	Low	Low	Low	Low	Low
Ohman et al. <sup>18</sup>	Low	Low	Low	High	Low	Low	Low	Low	Low
Perrone et al. <sup>36</sup>	Low	Low	Low	High	High	Low	Low	Low	Low
Pivetta et al. <sup>34</sup>	High	Low	Low	High	Low	Low	Low	Low	Low
Sartini et al. <sup>17</sup>	High	Low	Low	High	Low	High	Low	Low	Low
Vitturi et al. <sup>19</sup>	Low	Low	Low	High	High	Low	Low	Low	Low

LUS = lung ultrasound

CXR = chest x-ray

**eFigure 1.** QUADAS-2 Tool to Assess for Risk of Bias and Applicability

Domain 1: Patient selection

*Risk of bias*

Was a consecutive or random sample of patients enrolled? Yes/No/Unclear

Was a case-control design avoided? Yes/No/Unclear

Did the study avoid inappropriate exclusions? Yes/No/Unclear

Could the selection of patients have introduced bias? RISK: LOW/HIGH/UNCLEAR

*Concerns regarding applicability*

Is there concern that the included patients do not match the review question? CONCERN: LOW/HIGH/UNCLEAR

Domain 2: Index test

*Risk of bias*

Were the index test results interpreted without knowledge of the results of the reference standard? Yes/No/Unclear

If a threshold was used, was it pre-specified? Yes/No/Unclear

Could the conduct or interpretation of the index test have introduced bias? RISK: LOW/HIGH/UNCLEAR

*Concerns regarding applicability*

Is there concern that the index test, its conduct, or interpretation differ from the review question? CONCERN: LOW/HIGH/UNCLEAR

Domain 3: Reference standard

*Risk of bias*

Is the reference standard likely to correctly classify the target condition? Yes/No/Unclear

Were the reference standard results interpreted without knowledge of the results of the index test? Yes/No/Unclear

Could the reference standard, its conduct or its interpretation have introduced bias? RISK: LOW/HIGH/UNCLEAR

*Concerns regarding applicability*

Is there concern that the target condition as defined by the reference standard does not match the review question? CONCERN: LOW/HIGH/UNCLEAR

Domain 4: Flow and timing

*Risk of bias*

Was there an appropriate interval between index test(s) and reference standard? Yes/No/Unclear

Did all patients receive a reference standard? Yes/No/Unclear

Did patients receive the same reference standard? Yes/No/Unclear

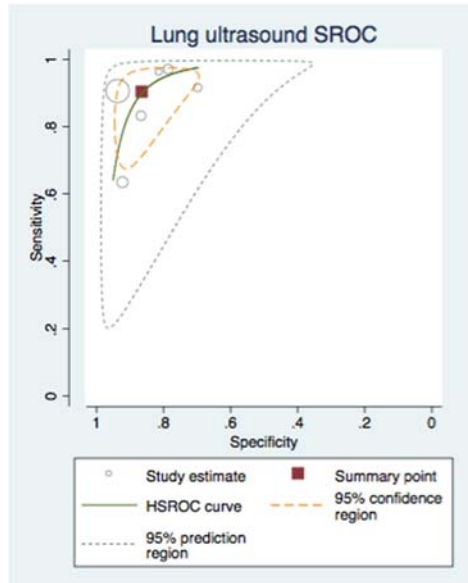
Were all patients included in the analysis? Yes/No/Unclear

Could the patient flow have introduced bias? RISK: LOW/HIGH/UNCLEAR



**eFigure 2.** Summary Receiver Operating Characteristic Curves for Lung Ultrasound and Chest X-ray

**A.**



**B.**

