World Health Organization

Use of chest imaging in COVID-19: a rapid advice guide

Web Annex B. GRADE evidence-to-decision tables

This publication forms part of the WHO rapid advice guide entitled *Use of chest imaging in COVID-19*. It is being made publicly available for transparency purposes and information, in accordance with the *WHO handbook for guideline development*, 2nd edition (2014).

WHO reference number: WHO/2019-nCoV/Clinical/Radiology_imaging/Web_Annex_B/2020.1

Contents

QUESTION (PICO 1)

Should chest imaging vs. no chest imaging be used for asymptomatic contacts of patients with COVID-19; contexts where laboratory testing (RT PCR) is not available/results are delayed/results are initially negative?	
POPULATION:	Asymptomatic contacts of patients with COVID-19
INTERVENTION:	Chest imaging
COMPARISON:	No chest imaging
MAIN OUTCOMES:	1. Accuracy of the diagnostic modality (rates of true positive, true negative, false positive, false negative) 2. Clinical outcomes • Mortality • Respiratory failure • Multiorgan failure • Shortness of breath • Recovery • Adverse effects of imaging (e.g., exposure to radiation) • COVID-19 transmission to health workers 3. Health systems outcomes • Service use, including: ○ Length of stay in Emergency Department ○ Length of hospital stay ○ Length of ICU stay • Availability of care • Access to care • Quality of care
SETTING:	Laboratory testing (RT PCR) is not available/results are delayed/results are initially negative
PERSPECTIVE:	Societal perspective
BACKGROUND:	
CONFLICT OF INTERESTS:	

ASSESSMENT

Desirable Effects

How substantial are the desirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS

● Trivial ○ Small ○ Moderate ○ Large ○ Varies ○ Don't know	• **No study evaluated the accuracy of the diagnostic imaging modality** • **No study evaluated the effects of chest imaging on clinical outcomes** • **No study evaluated the effects of chest imaging on health systems outcomes**	• Smaller benefit compared to the symptomatic population The voting results are: • Trivial: 5 • Small: 3 • Moderate: 1 • Large: 0 • Varies: 0 • Don't know: 0

Undesirable Effects

How substantial are the undesirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Large ● Moderate ○ Small ○ Trivial ○ Varies ○ Don't know	• **No study evaluated the accuracy of the diagnostic imaging modality** • **No study evaluated the effects of chest imaging on clinical outcomes** • **No study evaluated the effects of chest imaging on health systems outcomes**	The voting results are: • Large: 1 • Moderate: 6 • Small: 1 • Trivial: 1 • Varies: 0 • Don't know: 0

Certainty of evidence

What is the overall certainty of the evidence of effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
● Very low ○ Low ○ Moderate ○ High ○ No included studies		• Very low for CT scan vs no CT scan • Very low for chest Xray vs no chest Xray • Very low for LUS vs no LUS

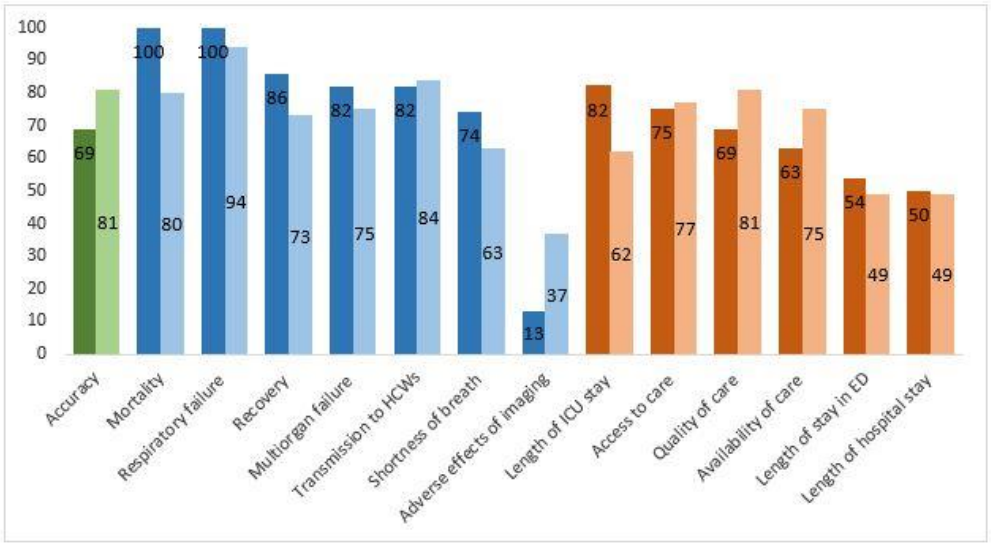
Values

Is there important uncertainty about or variability in how much people value the main outcomes?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Important uncertainty or variability ● Possibly important uncertainty or variability ○ Probably no important uncertainty or variability ○ No important uncertainty or variability	**Outcomes valuation (stakeholders n=249):**	The voting results are • Important uncertainty or variability: 2 • Possibly important uncertainty or variability: 7 • Probably no important uncertainty or variability: 4 • No important uncertainty or variability: 1

Outcomes	Not important (%)		Important (%)		Critical (%)	
	GDG	Stakeholders	GDG	Stakeholders	GDG	Stakeholders
Accuracy	0	1	32	19	69	81
Mortality	0	6	0	16	100	80
Respiratory failure	0	4	0	4	100	94
Multiorgan failure	0	5	19	22	82	75
Shortness of breath	0	6	27	33	74	63
Recovery	0	4	15	25	86	73
Adverse effects of imaging	44	24	44	40	13	37
Transmission to HCWs	7	3	13	14	82	84
Length of stay in ED	14	12	34	40	54	49
Length of hospital stay	13	8	38	44	50	49
Length of ICU stay	0	4	19	36	82	62
Availability of care	0	4	38	23	63	75
Access to care	0	4	25	21	75	77
Quality of care	7	3	25	18	69	81

Critical outcomes (GDG, stakeholders n=249):



Green: accuracy of the diagnostic modality; blue: clinical outcomes; orange: health systems outcomes

Dark color: GDG; light color: stakeholders

	Stakeholder respondents (n=249) included: •members of the public (3%) •patients (2%) •physicians (22%) •technicians (53%) •other health professionals (5%) •researchers (3%) •policy-makers (3%) •other (7%)	

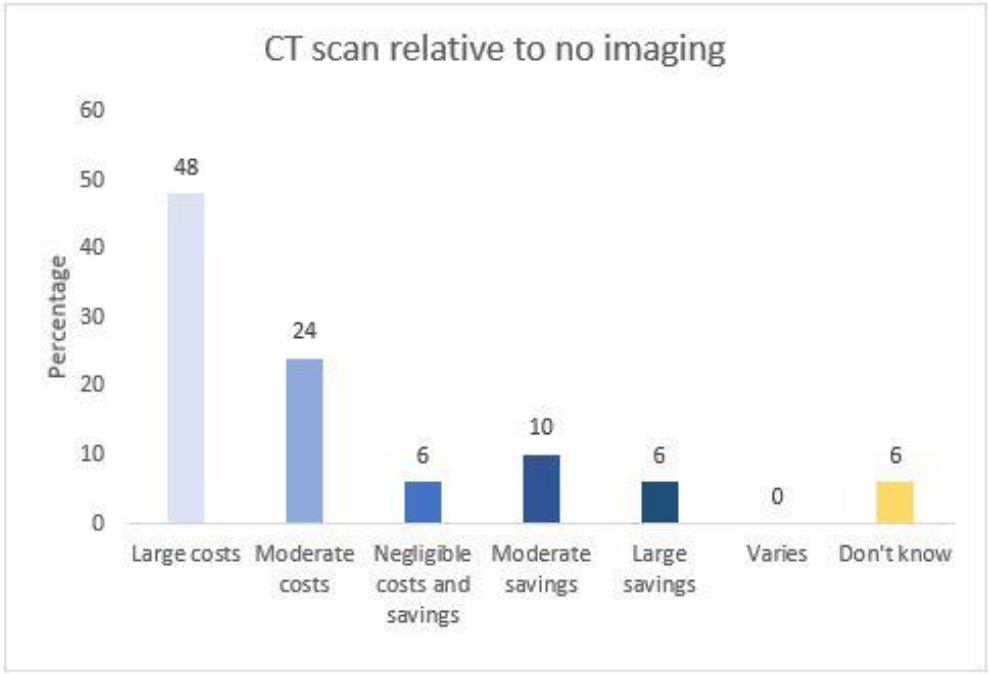
Balance of effects

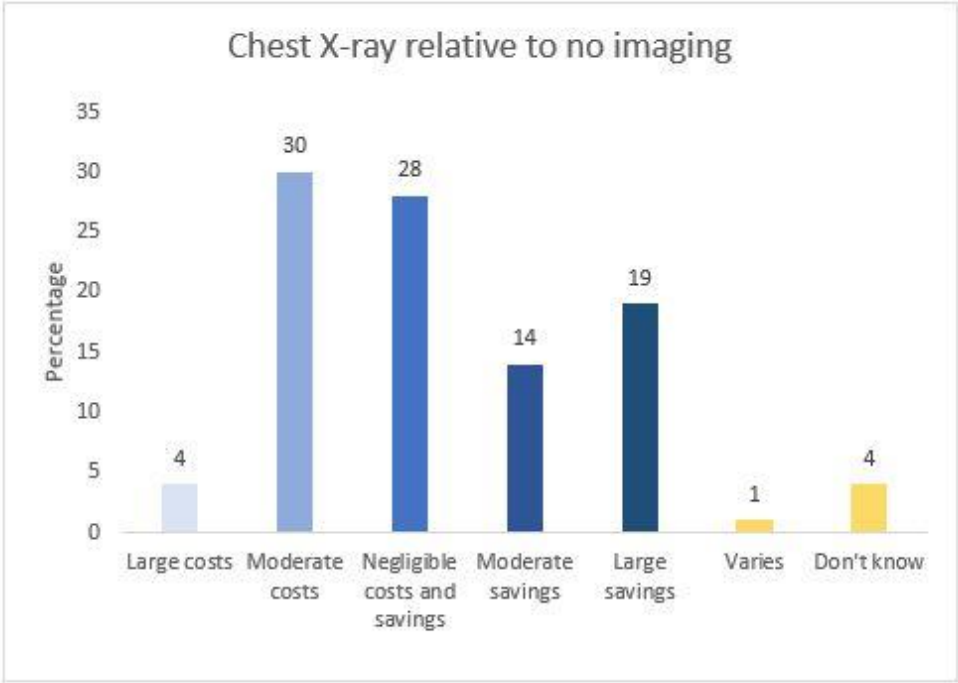
Does the balance between desirable and undesirable effects favor the intervention or the comparison?

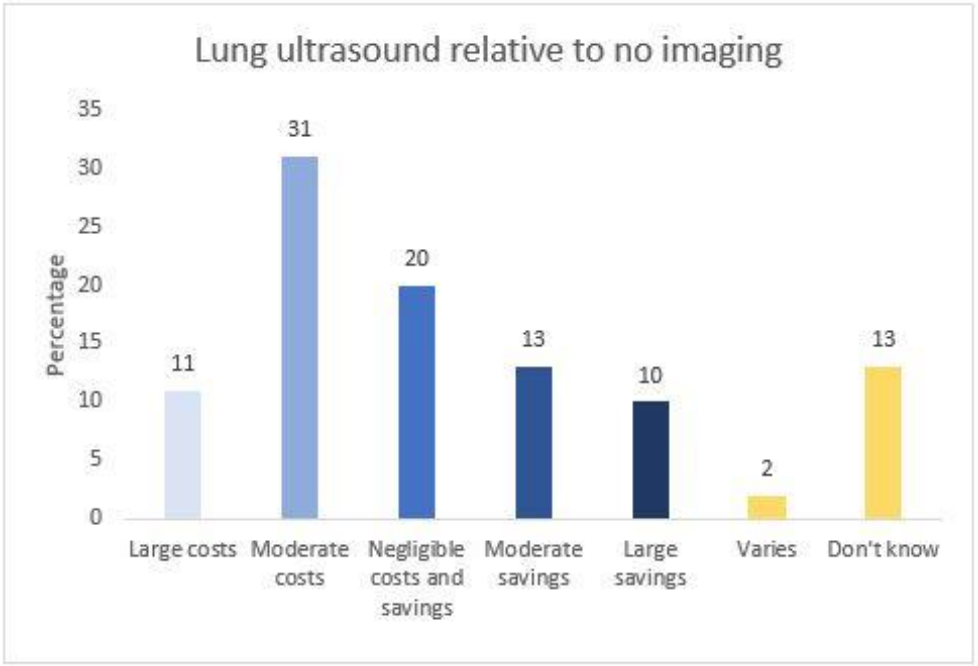
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
● Favors the comparison ○ Probably favors the comparison ○ Does not favor either the intervention or the comparison ○ Probably favors the intervention ○ Favors the intervention ○ Varies ○ Don't know		The voting results are: • Favors the comparison: 5 • Probably favors the comparison: 2 • Does not favor either the intervention or the comparison: 0 • Probably favors the intervention: 3 • Favors the intervention : 0 • Varies: 1 • Don't know : 0

Resources required

How large are the resource requirements (costs)?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
● Large costs ○ Moderate costs ○ Negligible costs and savings ○ Moderate savings ○ Large savings ○ Varies ○ Don't know		The voting results are: • Large costs: 10 • Moderate costs: 1 • Negligible costs and savings: 0 • Moderate savings: 1 • Large savings: 0 • Varies: 0 • Don't know : 0


Chest X-ray relative to no imaging
Percentage
35
30
25
20
15
10
5
0
4
30
28
14
19
1
4
Large costs
Moderate costs
Negligible costs and savings
Moderate savings
Large savings
Varies
Don't know



Respondents (n=124) included:

•members of the public (3%)

•patients (2%)

•physicians (16%)

•technicians (59%)

•other health professionals (4%)

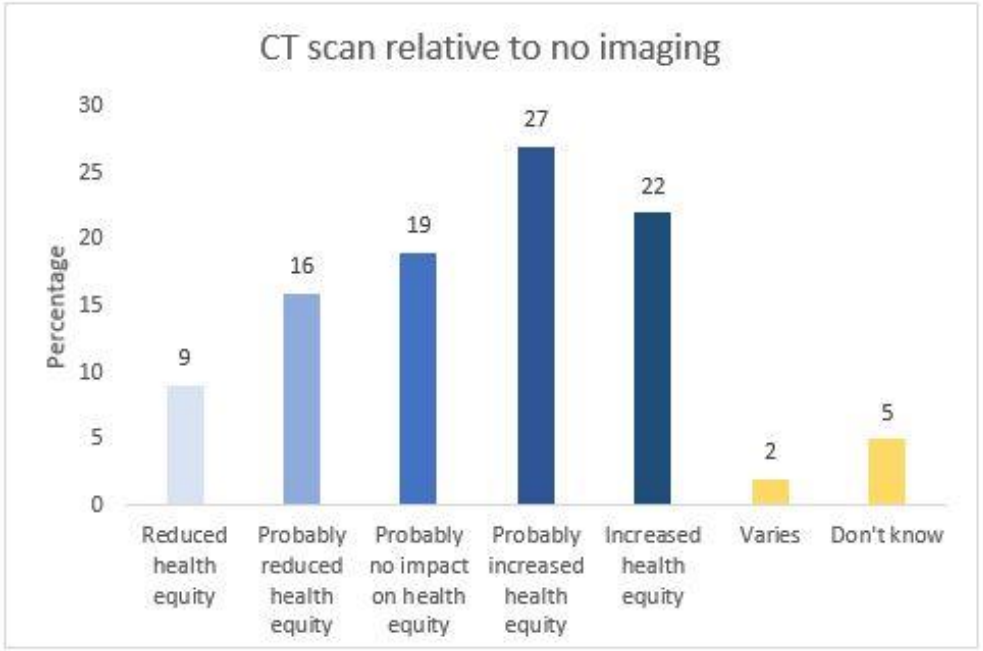
•researchers (4%)

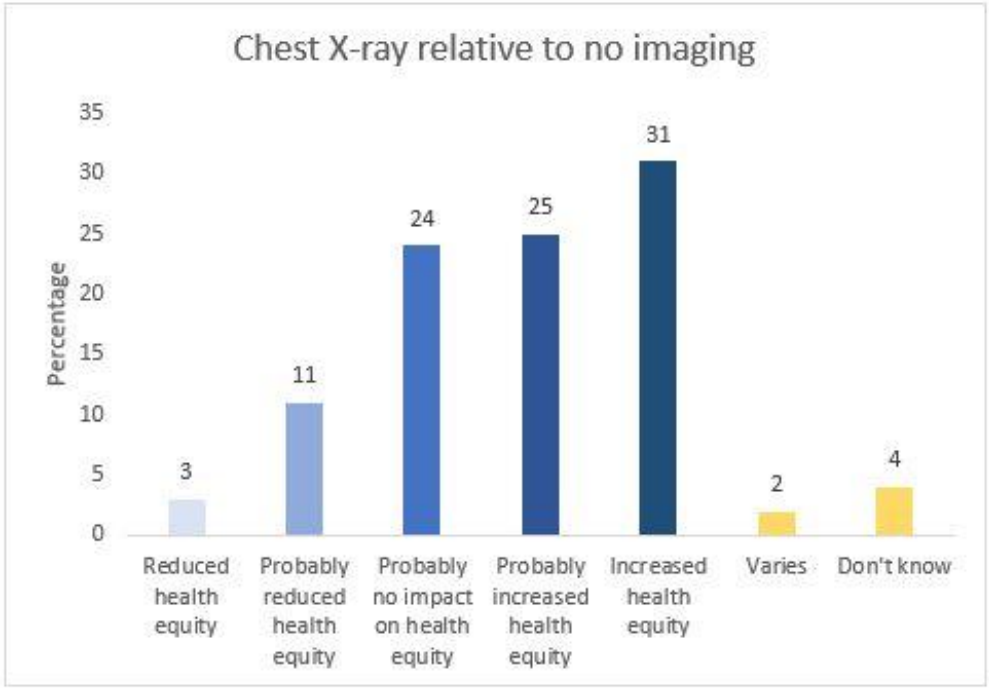
•policy-makers (4%)

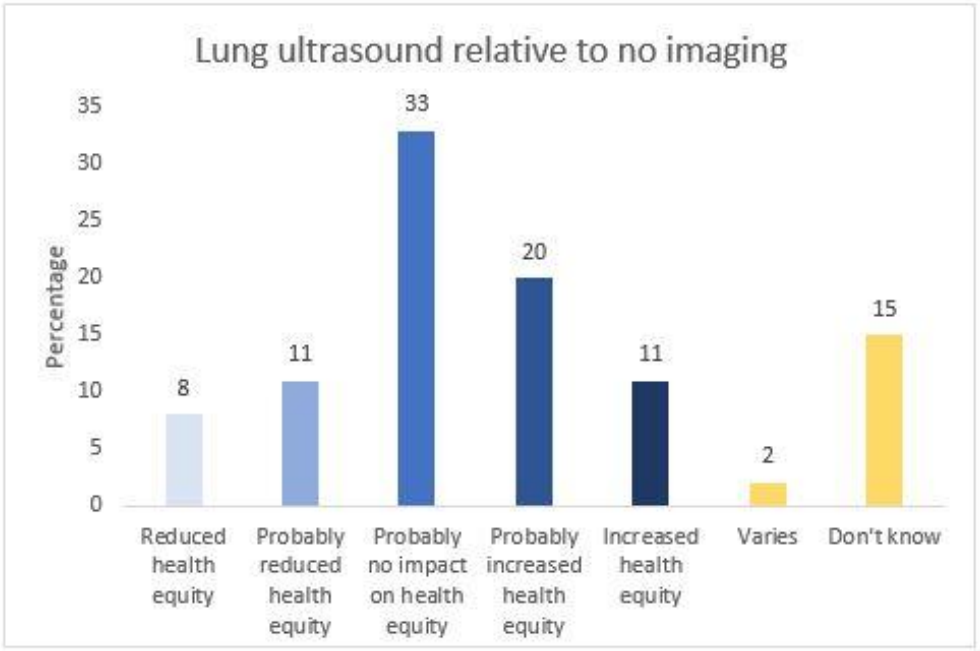
•other (8%)

Equity

What would be the impact on health equity?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
● Reduced ○ Probably reduced ○ Probably no impact ○ Probably increased ○ Increased ○ Varies ○ Don't know		The voting results are: • Reduced: 5 • Probably reduced: 4 • Probably no impact : 2 • Probably increased: 1 • Increased: 2 • Varies: 0 • Don't know : 0


Chest X-ray relative to no imaging
Percentage
35
30
25
20
15
10
5
0
3
11
24
25
31
2
4
Reduced health equity
Probably reduced health equity
Probably no impact on health equity
Probably increased health equity
Increased health equity
Varies
Don't know



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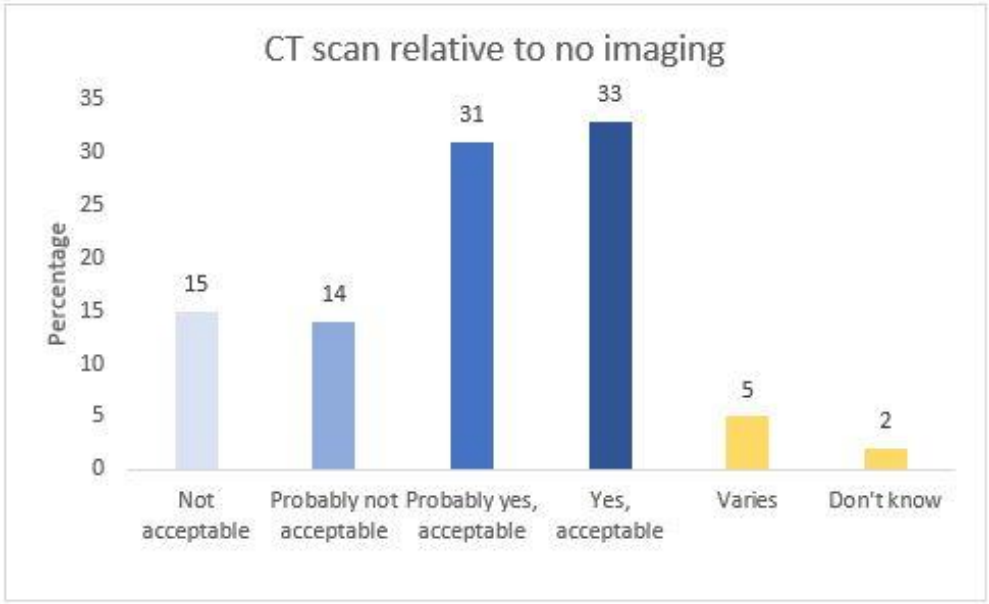
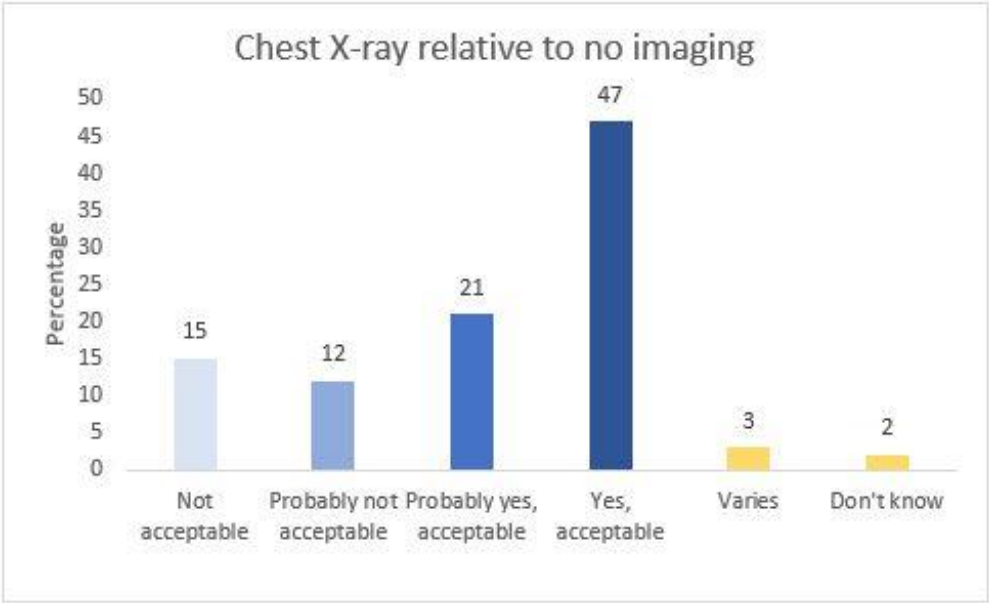
•policy-makers (4%)

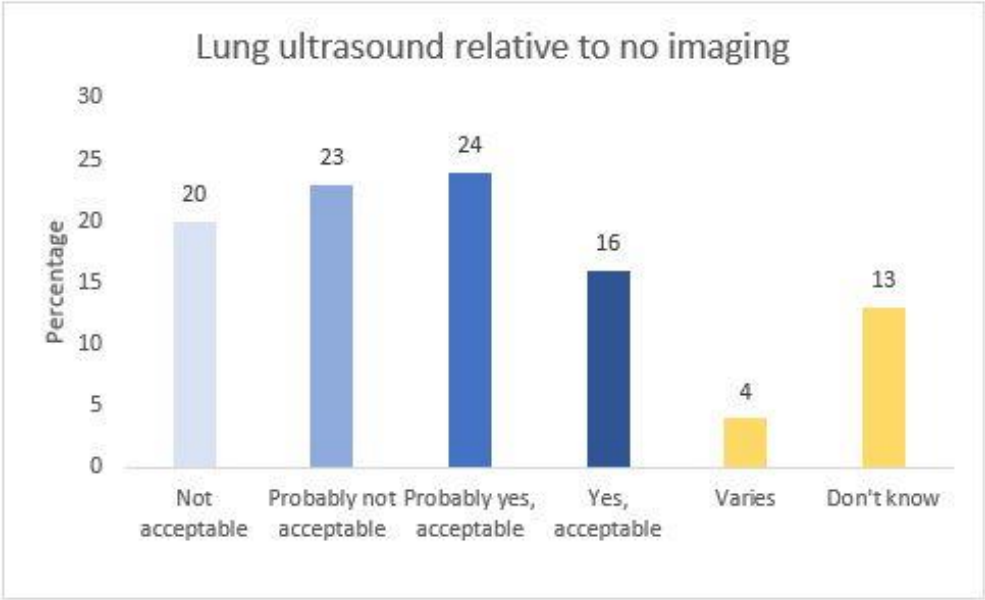
•other (8%)

Acceptability

Is the intervention acceptable to key stakeholders?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ● Probably no ○ Probably yes ○ Yes ○ Varies ○ Don't know		The voting results are: • No : 0 • Probably no : 4 • Probably yes: 4 • Yes: 2 • Varies: 2 • Don't know : 0





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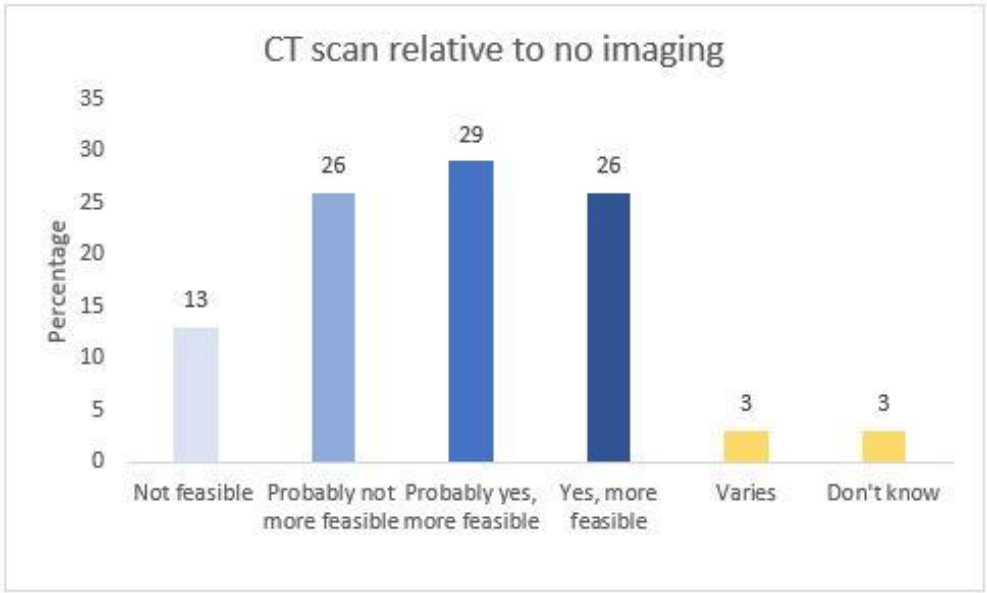
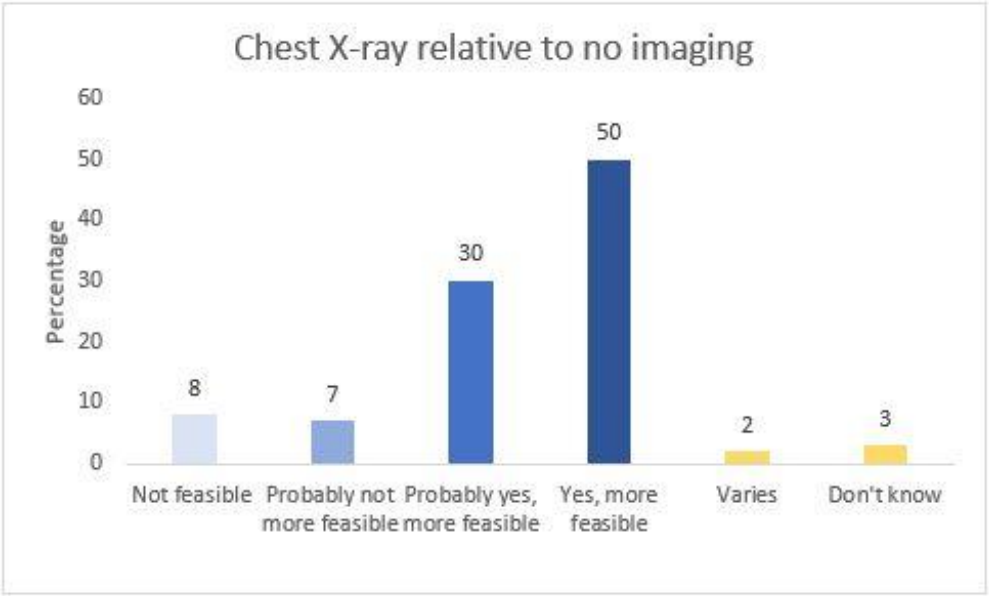
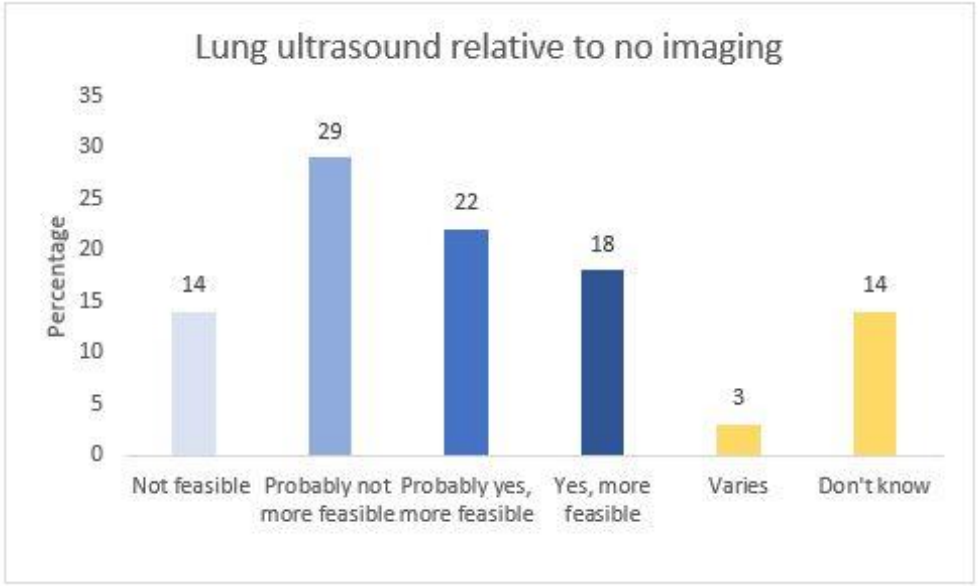
Feasibility

Is the intervention feasible to implement?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know		The voting results are: • No : 2 • Probably no : 4 • Probably yes: 6 • Yes: 3 • Varies: 0 • Don't know : 0


CT scan relative to no imaging
Percentage
35
30
25
20
15
10
5
0
13
26
29
26
3
3
Not feasible
Probably not more feasible
Probably yes, more feasible
Yes, more feasible
Varies
Don't know


Chest X-ray relative to no imaging
Percentage
60
50
40
30
20
10
0
8
7
30
50
2
3
Not feasible
Probably not more feasible
Probably yes, more feasible
Yes, more feasible
Varies
Don't know



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- policy-makers (4%)
- other (8%)

SUMMARY OF JUDGEMENTS

	JUDGEMENT						
DESIRABLE EFFECTS	**Trivial**	Small	Moderate	Large		Varies	Don't know
UNDESIRABLE EFFECTS	Large	**Moderate**	Small	Trivial		Varies	Don't know
CERTAINTY OF EVIDENCE	**Very low**	Low	Moderate	High			No included studies
VALUES	Important uncertainty or variability	**Possibly important uncertainty or variability**	Probably no important uncertainty or variability	No important uncertainty or variability			
BALANCE OF EFFECTS	**Favors the comparison**	Probably favors the comparison	Does not favor either the intervention or the comparison	Probably favors the intervention	Favors the intervention	Varies	Don't know
RESOURCES REQUIRED	**Large costs**	Moderate costs	Negligible costs and savings	Moderate savings	Large savings	Varies	Don't know
EQUITY	**Reduced**	Probably reduced	Probably no impact	Probably increased	Increased	Varies	Don't know
ACCEPTABILITY	No	**Probably no**	Probably yes	Yes		Varies	Don't know
FEASIBILITY	No	Probably no	**Probably yes**	Yes		Varies	Don't know

TYPE OF RECOMMENDATION

Strong recommendation against the intervention	**Conditional recommendation against the intervention**	Conditional recommendation for either the intervention or the comparison	Conditional recommendation for the intervention	Strong recommendation for the intervention
○	●	○	○	○

CONCLUSIONS

Recommendation

For asymptomatic contacts of patients with COVID19, WHO **suggests not** using chest imaging for the diagnosis of COVID-19 (conditional recommendation, based on very low certainty evidence)

Conditions:

- Higher risk of disease progression
- In need of emergency procedures
- implementing public health interventions (e.g., quarantine)

Remarks:

When choosing the imaging modality, consider the following:

- CT scan has the highest sensitivity and is preferred in patients with pre-existing pulmonary disease;
- Chest x-ray has a lower sensitivity but is associated with lower risk of HCW infection transmission; is less resource intensive; is associated with lower radiation doses than CT scan; and is easier to repeat sequentially for monitoring disease progression;
- LUS has limited evidence but is helpful with the appropriate expertise and can be done at the point of care. However, it requires closer physical proximity of the operator to the patient for a longer period of time and requires specific infection prevention and control precautions;
- Choice should consider the differential diagnosis in the specific case (e.g., CT angiography for pulmonary embolism, LUS for pleural effusions)
- Choice should be through a shared decision making involving the patient, the referrer physician and the radiologist;

The voting results are:

- Strong recommendation against the intervention: 7
- Conditional recommendation against the intervention: 3
- Conditional recommendation for either the intervention or the comparison: 1
- Conditional recommendation for the intervention: 3
- Strong recommendation for the intervention: 0

Justification

Subgroup considerations

Implementation considerations

Monitoring and evaluation

Research priorities

QUESTION (PICO 2)

Should chest imaging vs. no chest imaging be used for symptomatic patients with suspected COVID-19; contexts where laboratory testing (RT PCR) is not available/results are delayed/results are initially negative?

POPULATION:	Symptomatic patients with suspected COVID-19
INTERVENTION:	Chest imaging
COMPARISON:	No chest imaging
MAIN OUTCOMES:	1. Accuracy of the diagnostic modality (rates of true positive, true negative, false positive, false negative) 2. Clinical outcomes • Mortality • Respiratory failure • Multiorgan failure • Shortness of breath • Recovery • Adverse effects of imaging (e.g., exposure to radiation) • COVID-19 transmission to health workers 3. Health systems outcomes • Service use, including: ○ Length of stay in Emergency Department ○ Length of hospital stay ○ Length of ICU stay • Availability of care • Access to care

	• Quality of care
SETTING:	Laboratory testing (RT PCR) is not available/results are delayed/results are initially negative
PERSPECTIVE:	Societal perspective
BACKGROUND:	
CONFLICT OF INTERESTS:	

ASSESSMENT

Desirable Effects

How substantial are the desirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Trivial ○ Small ● Moderate ○ Large ○ Varies ○ Don't know	CT scanning **Test result** — **Number of results per 1,000 patients tested** Prevalence 20% / Prevalence 40% / Prevalence 60% / Prevalence 80% **True positives**: 184 / 368 / 552 / 736 **False negatives**: 16 / 32 / 48 / 64 **True negatives**: 448 / 336 / 224 / 112 **False positives**: 352 / 264 / 176 / 88 Se=0.92; Sp=0.56	• Potential benefit of shortening length of stay in ED • In patients who already qualify for admission, the CT would be beneficial in COVID19 unit (based on the presentation) • Using the CT to rule out COVID-19 might be safest in low prevalence setting (lower FNs) • Using the CT to rule in might be safest in high prevalence setting (lower FPs) • Disposition of patients whom the decision to admit is already made • Implementation of public health measures (those who are likely to be discharged, with not a confirmed PCR delayed/unavailable RT-PCR): outpatient guidance [maximized in low prevalence setting] • In patients who have tested negative by PCR but have clinical suspicion, perform a CT scan. The voting results are: • Trivial: 2 • Small: 1 • Moderate: 8 • Large: 4 • Varies: 0

CXR

Test result	Number of results per 1,000 patients tested			
	Prevalence 20%	Prevalence 40%	Prevalence 60%	Prevalence 80%
True positives	128	256	384	512
False negatives	72	144	216	288
True negatives	656	492	328	164
False positives	144	108	72	36

Se=0.64; Sp=0.82

LUS

Test result	Number of results per 1,000 patients tested			
	Prevalence 20%	Prevalence 40%	Prevalence 60%	Prevalence 80%
True positives	190	380	570	760
False negatives	10	20	30	40
True negatives	664	498	332	166
False positives	136	102	68	34

Se=0.95; Sp=0.83

No study evaluated the effects of chest imaging on health outcomes

No study evaluated the effects of chest imaging on health systems outcomes

- Don't know: 0

Undesirable Effects

How substantial are the undesirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS

○ Large ○ Moderate ● Small ○ Trivial ○ Varies ○ Don't know	CT scanning 	Test result	Number of results per 1,000 patients tested			
---	---	---	---	---
	Prevalence 20%	Prevalence 40%	Prevalence 60%	Prevalence 80%
True positives	184	368	552	736
False negatives	16	32	48	64
True negatives	448	336	224	112
False positives	352	264	176	88 | Se=0.92; Sp=0.56 CXR | Test result	Number of results per 1,000 patients tested			
---	---	---	---	---
	Prevalence 20%	Prevalence 40%	Prevalence 60%	Prevalence 80%
True positives	128	256	384	512
False negatives	72	144	216	288
True negatives	656	492	328	164
False positives	144	108	72	36	 Se=0.64; Sp=0.82	• Exposure of radiation • Use low-dose CT • Transmission to HCWs • Transmission to patients • Pregnant/children: higher risk The voting results are: • Large: 1 • Moderate: 4 • Small: 6 • Trivial: 1 • Varies: 2 • Don't know: 0

LUS

Test result	Number of results per 1,000 patients tested			
	Prevalence 20%	Prevalence 40%	Prevalence 60%	Prevalence 80%
True positives	190	380	570	760
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Certainty of evidence

What is the overall certainty of the evidence of effects?

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○ Very low ● Low ○ Moderate ○ High ○ No included studies		Low for CT vs. no CT Very low for CXR vs. no CXR Very low for US vs. no US

Values

Is there important uncertainty about or variability in how much people value the main outcomes?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Important uncertainty or variability ● Possibly important uncertainty or variability ○ Probably no important uncertainty or variability ○ No important uncertainty or variability	**Outcomes valuation (stakeholders n=249):**	The voting results are: • Important uncertainty or variability: 2 • Possibly important uncertainty or variability: 7 • Probably no important uncertainty or variability: 4 • No important uncertainty or variability: 1

Outcomes	Not important (%)		Important (%)		Critical (%)	
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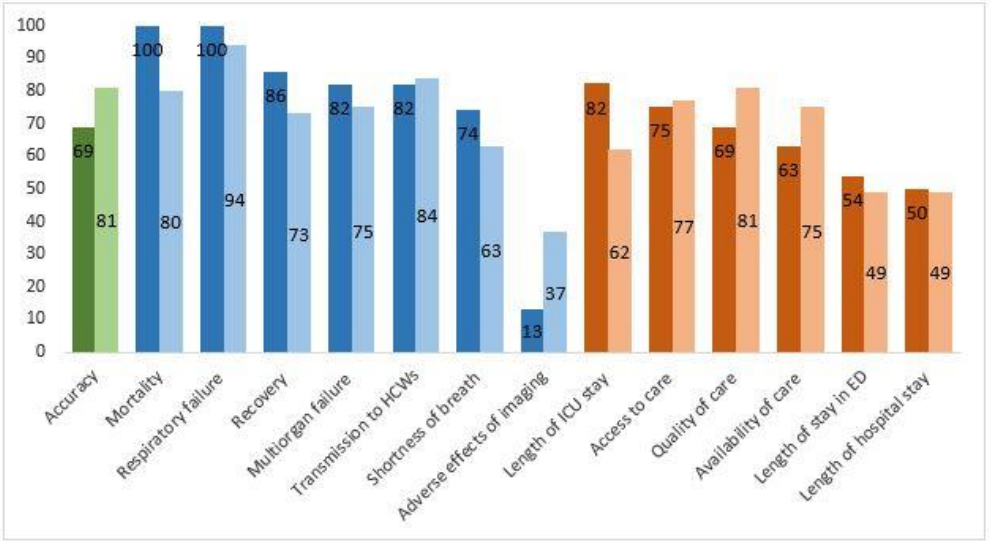
Critical outcomes (GDG, stakeholders n=249):



Green: accuracy of the diagnostic modality; blue: clinical outcomes; orange: health systems outcomes

Dark color: GDG; light color: stakeholders

	Stakeholder respondents (n=249) included: •members of the public (3%) •patients (2%) •physicians (22%) •technicians (53%) •other health professionals (5%) •researchers (3%) •policy-makers (3%) •other (7%)	

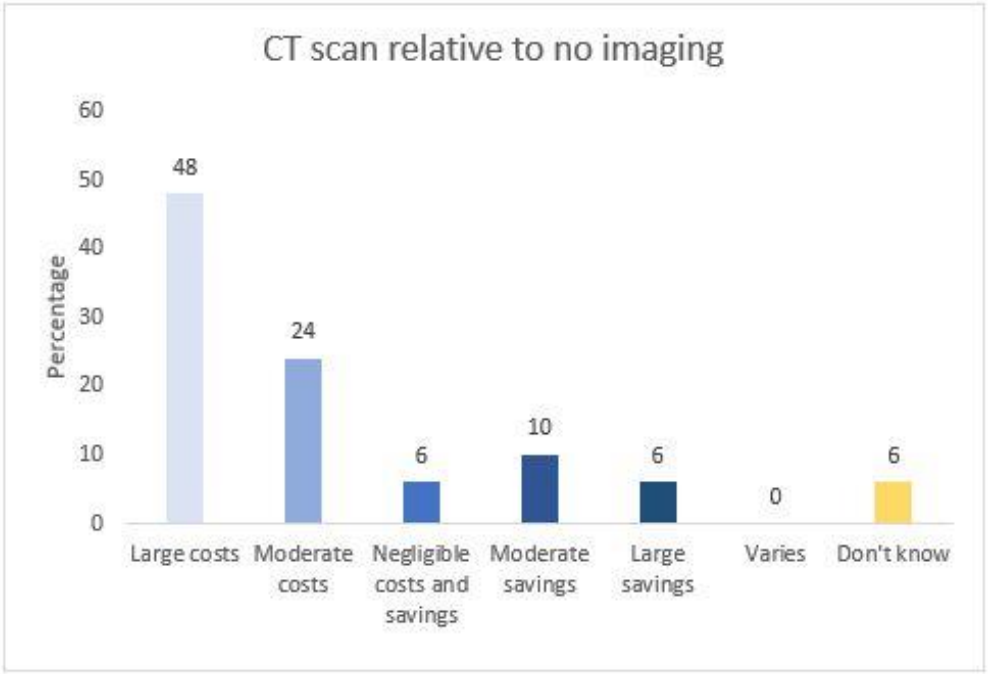
Balance of effects

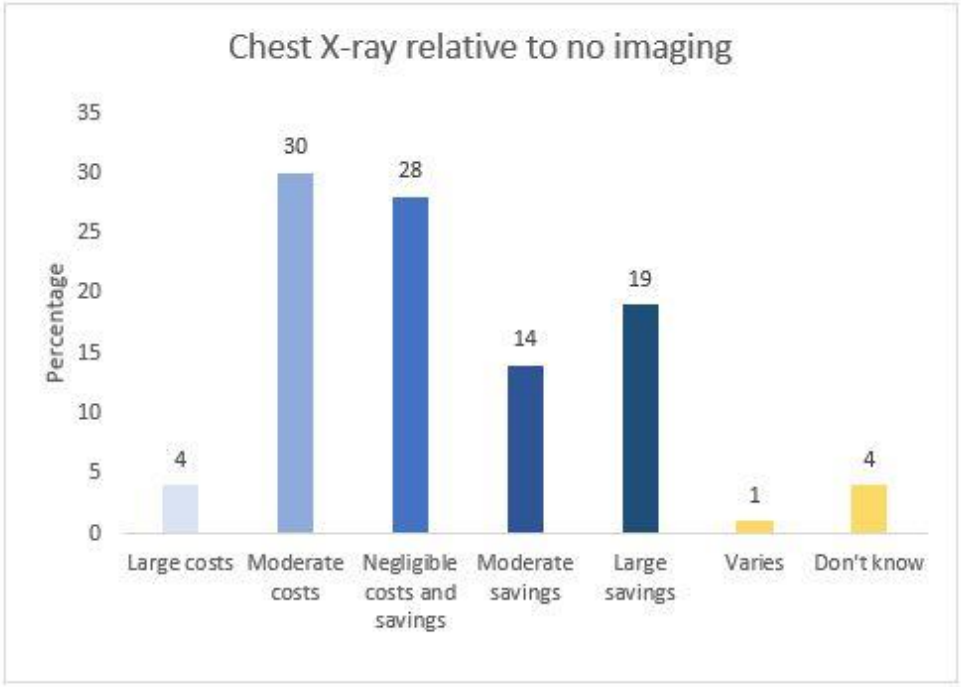
Does the balance between desirable and undesirable effects favor the intervention or the comparison?

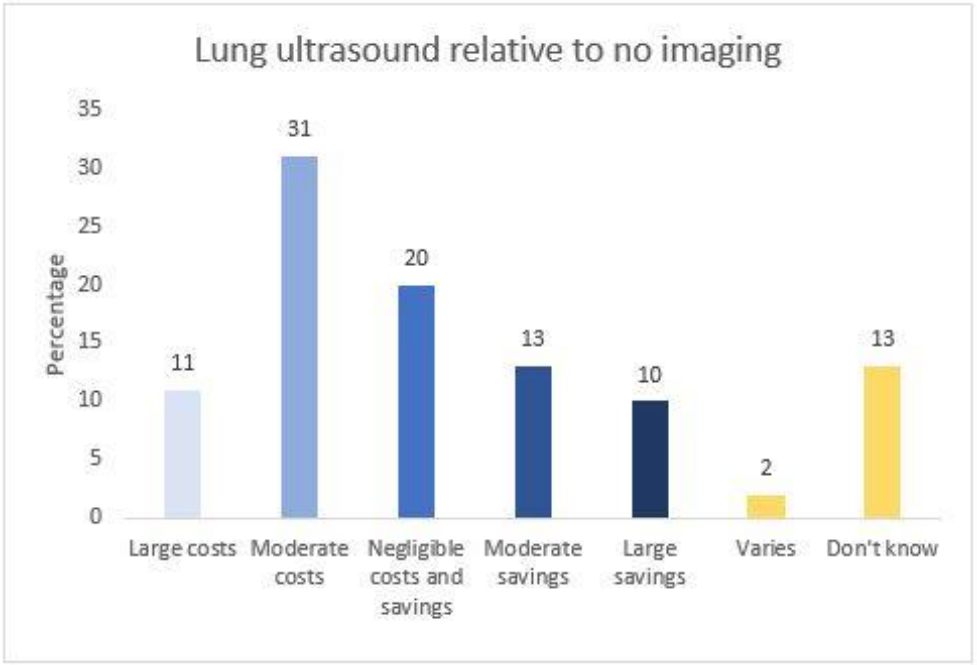
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Favors the comparison ○ Probably favors the comparison ○ Does not favor either the intervention or the comparison ● Probably favors the intervention ○ Favors the intervention ○ Varies ○ Don't know		The voting results are: • Favors the comparison: 1 • Probably favors the comparison: 1 • Does not favor either the intervention or the comparison: 1 • Probably favors the intervention: 7 • Favors the intervention: 1 • Varies: 2 • Don't know: 0

Resources required

How large are the resource requirements (costs)?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Large costs ● Moderate costs ○ Negligible costs and savings ○ Moderate savings ○ Large savings ○ Varies ○ Don't know		• The cost might be high in certain settings i.e. the resources needed to book and conduct the test • The cost includes HCW protection, utilization of the space, transfer of patients and payment for expert reading • Part of the cost might be on patients The voting results are: • Large costs: 5 • Moderate costs: 7 • Negligible costs and savings: 1 • Moderate savings: 1 • Large savings: 0 • Varies: 0 • Don't know : 0


Chest X-ray relative to no imaging
Percentage
35
30
25
20
15
10
5
0
4
30
28
14
19
1
4
Large costs
Moderate costs
Negligible costs and savings
Moderate savings
Large savings
Varies
Don't know



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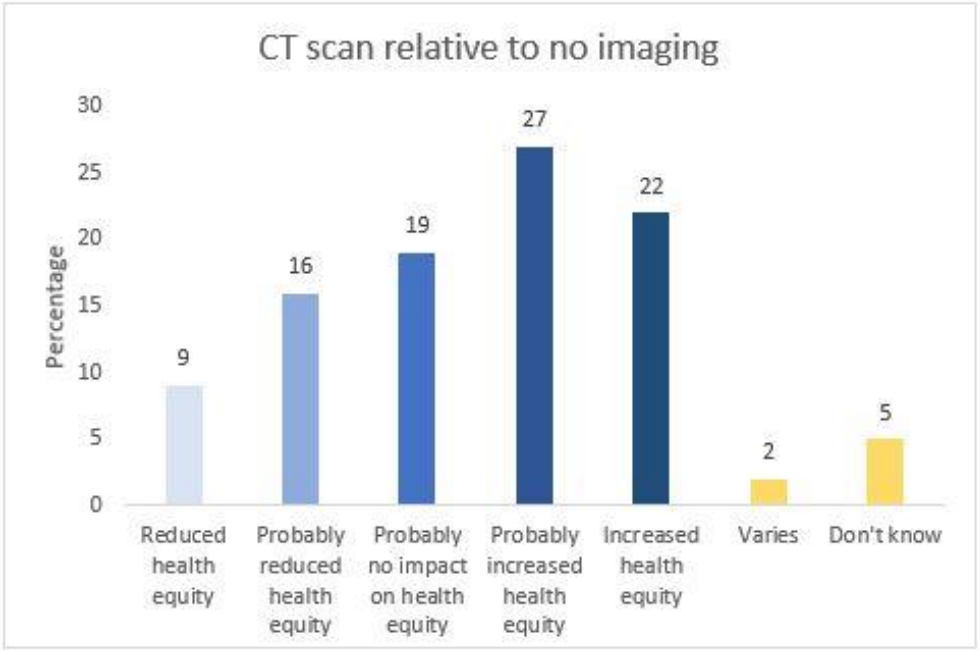
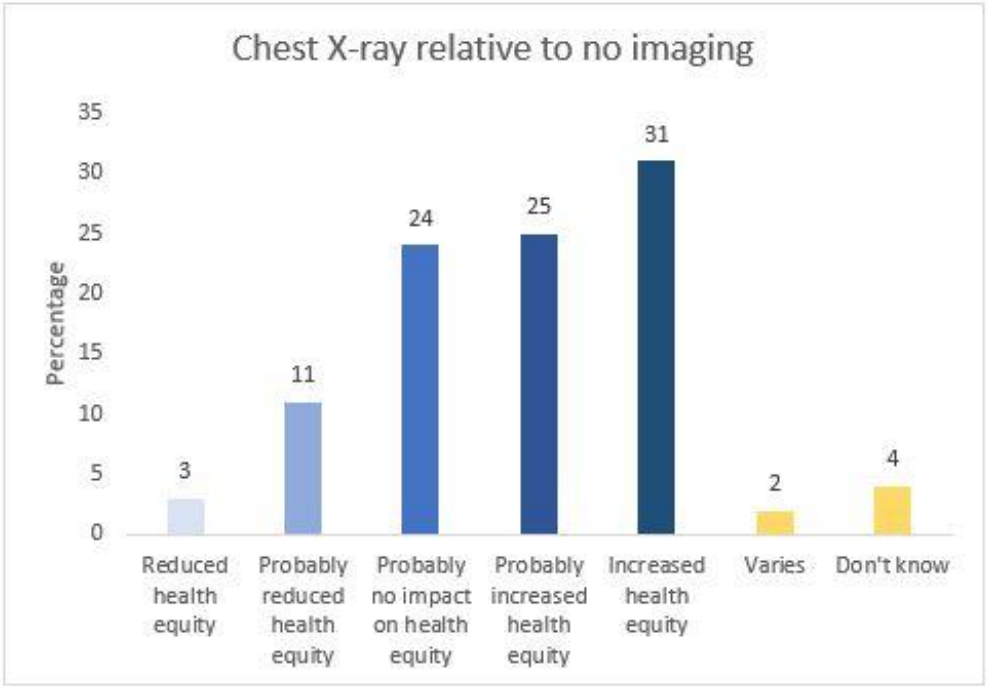
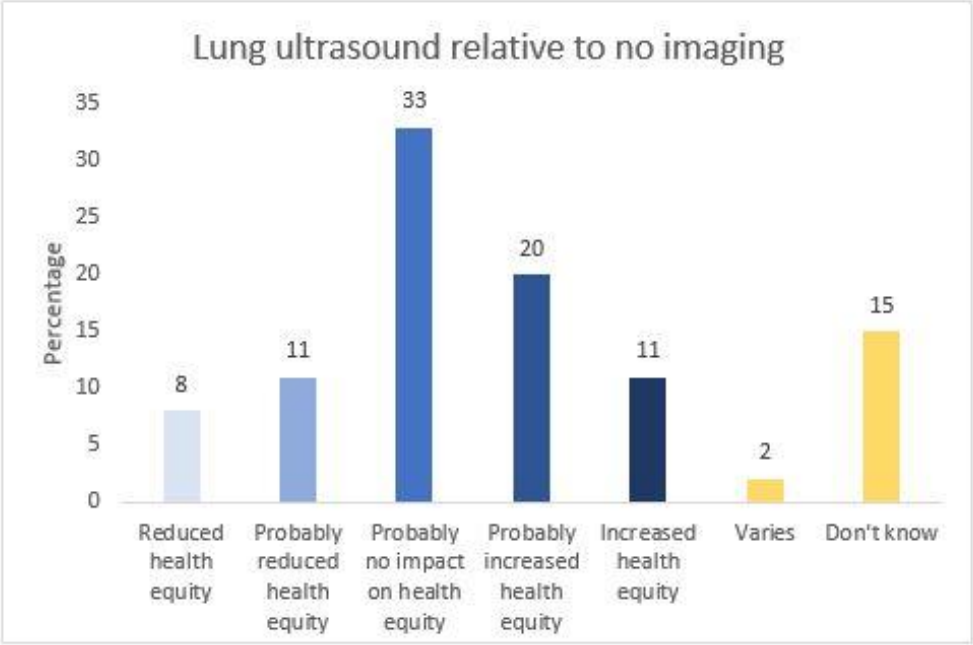
Equity

What would be the impact on health equity?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Reduced ● Probably reduced ○ Probably no impact ○ Probably increased ○ Increased ○ Varies ○ Don't know		• In some settings when patients have to pay out of pocket, those who are disadvantaged might be affected • Accessibility of CT scans in communities with limited health resources • Impact on equity might depend on whether the fees are covered • diversion of resources from non-COVID care The voting results are: • Reduced: 0 • Probably reduced: 8 • Probably no impact : 0 • Probably increased: 4 • Increased: 2 • Varies: 0 • Don't know : 0


Chest X-ray relative to no imaging
Percentage
35
30
25
20
15
10
5
0
3
11
24
25
31
2
4
Reduced health equity
Probably reduced health equity
Probably no impact on health equity
Probably increased health equity
Increased health equity
Varies
Don't know



Respondents (n=124) included:

•members of the public (3%)

•patients (2%)

•physicians (16%)

•technicians (59%)

•other health professionals (4%)

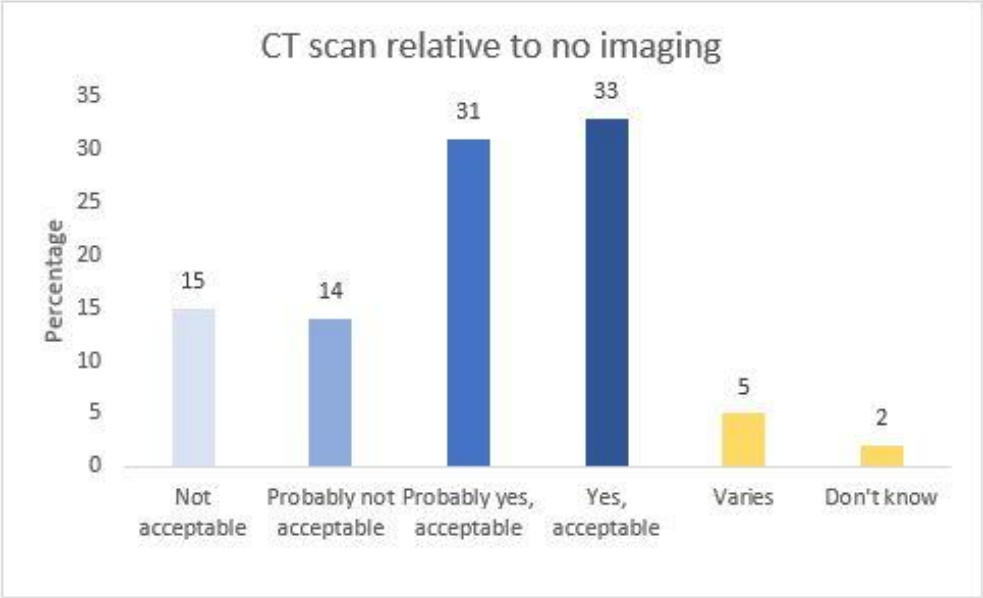
•researchers (4%)

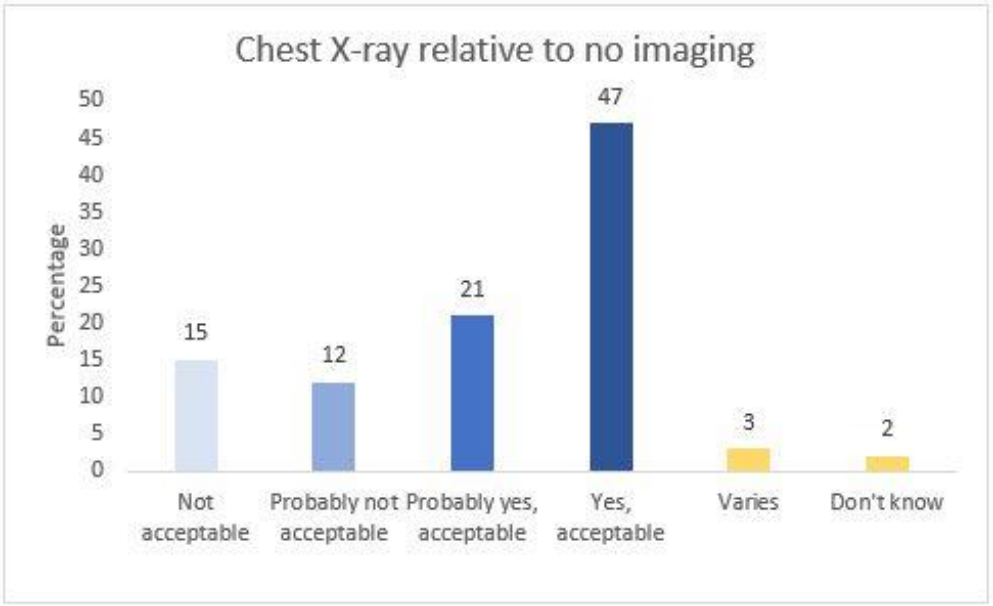
•policy-makers (4%)

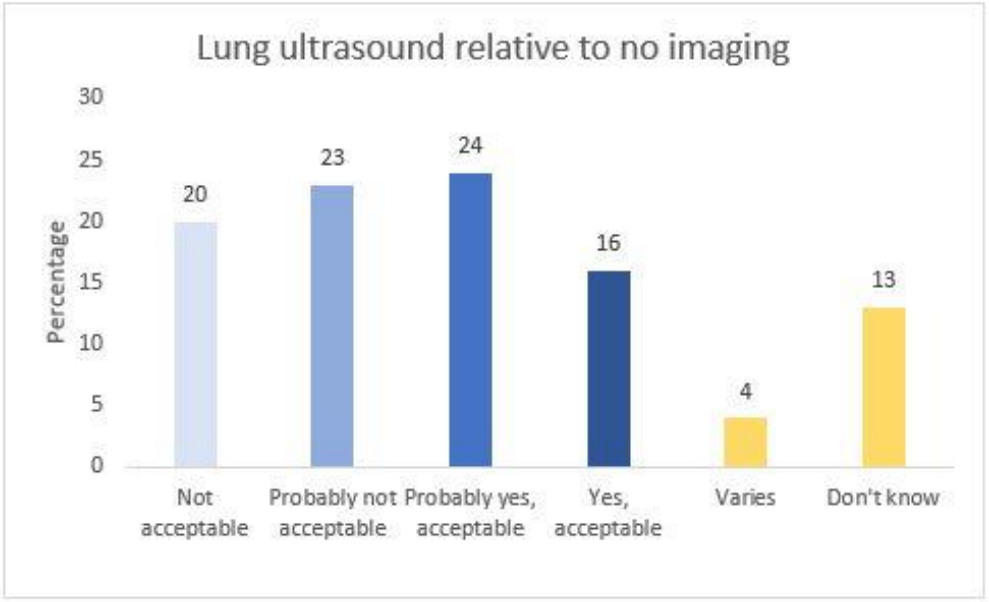
•other (8%)

Acceptability

Is the intervention acceptable to key stakeholders?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know		• Providing information to patients is required • Consent would be ideal, but might not be feasible • Likely to be acceptable for patients, less likely to be acceptable to technicians • Varies by the administrator • Might be less acceptable to payers • Perform low-dose CT whenever possible The voting results are: • No : 0 • Probably no : 1 • Probably yes: 9 • Yes: 5 • Varies: 0 • Don't know : 0





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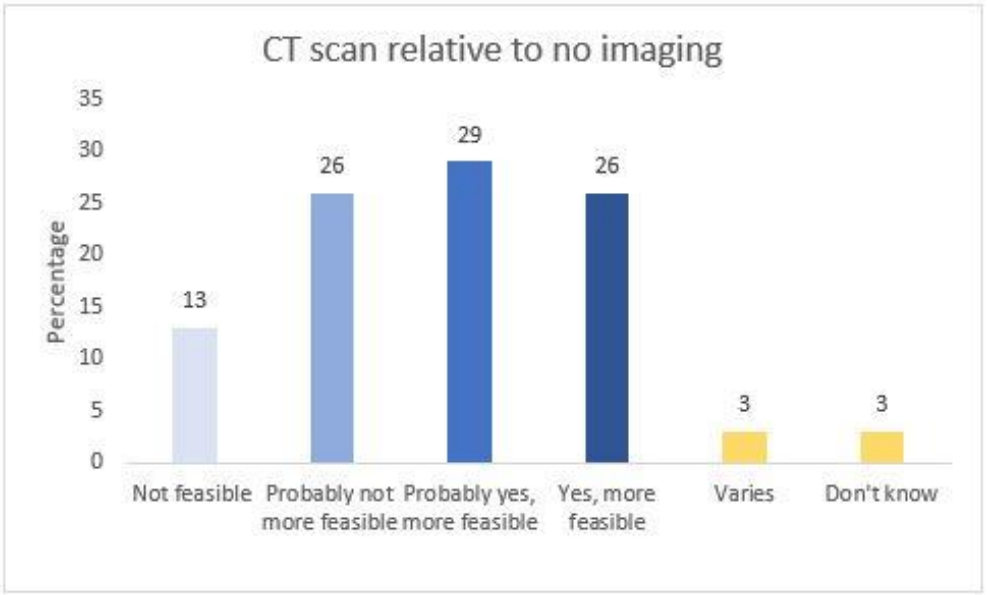
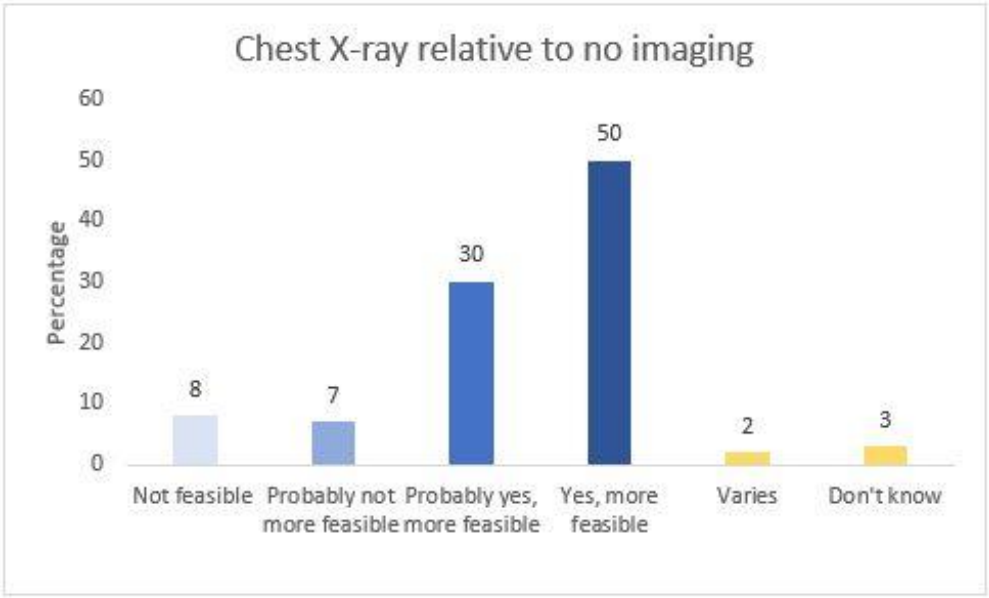
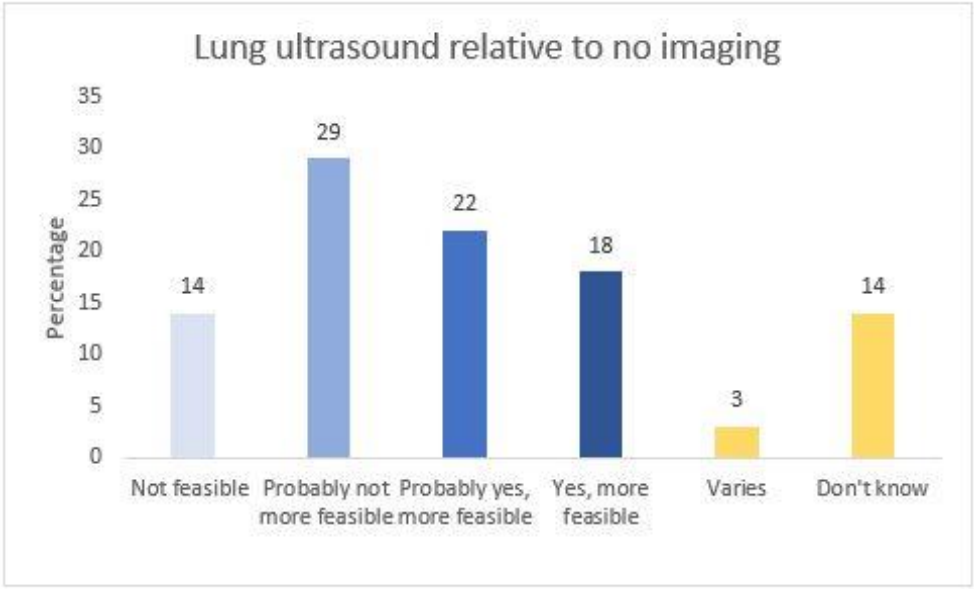
Feasibility

Is the intervention feasible to implement?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know		• Need to clean CT unit • Stop the non-urgent use of CT scan (issue of access and availability) • Availability of staff to interpret the scan (24/7) • Adapting the workflow in the CT room The voting results are: • No : 0 • Probably no : 0 • Probably yes: 10 • Yes: 4 • Varies: 0 • Don't know : 0





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	•patients (2%) •physicians (16%) •technicians (59%) •other health professionals (4%) •researchers (4%) •policy-makers (4%) •other (8%)	

SUMMARY OF JUDGEMENTS

	JUDGEMENT						
DESIRABLE EFFECTS	Trivial	Small	**Moderate**	Large		Varies	Don't know
UNDESIRABLE EFFECTS	Large	Moderate	**Small**	Trivial		Varies	Don't know
CERTAINTY OF EVIDENCE	Very low	**Low**	Moderate	High			No included studies
VALUES	Important uncertainty or variability	**Possibly important uncertainty or variability**	Probably no important uncertainty or variability	No important uncertainty or variability			
BALANCE OF EFFECTS	Favors the comparison	Probably favors the comparison	Does not favor either the intervention or the comparison	**Probably favors the intervention**	Favors the intervention	Varies	Don't know
RESOURCES REQUIRED	Large costs	**Moderate costs**	Negligible costs and savings	Moderate savings	Large savings	Varies	Don't know
EQUITY	Reduced	**Probably reduced**	Probably no impact	Probably increased	Increased	Varies	Don't know
ACCEPTABILITY	No	Probably no	**Probably yes**	Yes		Varies	Don't know
FEASIBILITY	No	Probably no	**Probably yes**	Yes		Varies	Don't know

TYPE OF RECOMMENDATION

Strong recommendation against the intervention	Conditional recommendation against the intervention	Conditional recommendation for either the intervention or the comparison	Conditional recommendation for the intervention	Strong recommendation for the intervention
○	○	○	○	○

CONCLUSIONS

Recommendation

1-When PCR testing is available with timely results, using vs. not using CT scan to diagnose COVID 19.

When PCR testing is available with timely results, *conditionally against* using CT scan.

The voting results are:

- Strong recommendation against the intervention: 2
- Conditional recommendation against the intervention: 9
- Conditional recommendation for either the intervention or the comparison: 2
- Conditional recommendation for the intervention: 3
- Strong recommendation for the intervention: 0

2-When PCR testing is not available, using vs. not using CT scan to diagnose COVID 19

When PCR testing is not available, *conditionally for* using CT scan to diagnose COVID 19

· *the rate of false-negative will be the lowest in low prevalence settings and in patients with low pretest probability (e.g., clinical presentation not consistent with COVID19)*

· In patients who need to be admitted irrespective of diagnosis/likelihood of disease progression, to help with disposition (to dedicated COVID floor vs. non COVID floor)

Consider different alternatives e.g. chest x-ray

The voting results are:

- Strong recommendation against the intervention: 0
- Conditional recommendation against the intervention: 2
- Conditional recommendation for either the intervention or the comparison: 0
- Conditional recommendation for the intervention: 8
- Strong recommendation for the intervention: 6

3-When PCR testing is available, but results are delayed, using vs. not using CT scan to diagnose COVID 19

When PCR testing is available, but results are delayed, *conditionally for* using CT scan to diagnose COVID 19

· In patients requiring emergency procedures or other urgent interventions (e.g., in patients with stroke, requiring hemodialysis)

· In patients who need to be admitted irrespective of diagnosis/likelihood of disease progression, to help with disposition (to dedicated COVID floor vs. non COVID floor)

· In patients who need to be transferred to another facility

The voting results are:

- Strong recommendation against the intervention: 1
- Conditional recommendation against the intervention: 3
- Conditional recommendation for either the intervention or the comparison: 1
- Conditional recommendation for the intervention: 8
- Strong recommendation for the intervention: 1

4-In patients with negative initial PCR test, but with clinical suspicion of COVID19 (e.g., severe presentation or with co-morbidities), using vs. not using CT scan to diagnose COVID 19

In patients with negative initial PCR test, but with clinical suspicion of COVID19 (e.g., severe presentation or with co-morbidities), *conditionally for* using CT scan to diagnose COVID 19

The voting results are:

- Strong recommendation against the intervention: 0
- Conditional recommendation against the intervention: 1
- Conditional recommendation for either the intervention or the comparison: 1
- Conditional recommendation for the intervention: 8
- Strong recommendation for the intervention: 4

Conditions (apply to 1 thru 4)

· Those who are discharged based on a negative CT scan result, need to consider a small chance of false-negative results and abide by public health measures (e.g., quarantine) until definitive PCR diagnosis is made

· Resource use

· Feasibility (PPE)

· Acceptability (technicians)

· Special attention to pregnant women and children

· Apply appropriate clinical measures taking into account the possibility of false-negative results.

When choosing the imaging modality, consider the following:

- CT scan has the highest sensitivity and is preferred in patients with pre-existing pulmonary disease;
- Chest x-ray has a lower sensitivity but is associated with lower risk of HCW infection transmission; is less resource intensive; is associated with lower radiation doses than CT scan; and is easier to repeat sequentially for monitoring disease progression;
- LUS has limited evidence but is helpful with the appropriate expertise and can be done at the point of care. However, it requires closer physical proximity of the operator to the patient for a longer period of time and requires specific infection prevention and control precautions;
- Choice should consider the differential diagnosis in the specific case (e.g., CT angiography for pulmonary embolism, LUS for pleural effusions)
- Choice should be through a shared decision making involving the patient, the referrer physician and the radiologist;

Remarks:

Patients likely to benefits are those who:

- require emergency procedures or other urgent interventions (e.g., in patients with stroke, patients requiring hemodialysis);
- need to be admitted irrespective of diagnosis (e.g., disease is severe or likely to progress), to help with disposition (to dedicated COVID19 floor vs. non COVID19 floor);
- need to be transferred to another facility.
- when using chest x-ray and CT scan, optimize radiation dose, and use digital imaging rather than film (to decrease contamination).

**The voting was based on using CT scan vs not using CT scan, however the group decided that this applies to imaging vs no imaging.

Justification

Subgroup considerations

Implementation considerations

Monitoring and evaluation

Research priorities

QUESTION (PICO 3)

Should chest imaging vs. no chest imaging be used for patients with suspected or confirmed COVID-19 and mild symptoms presenting to the healthcare system (e.g. emergency department); context of a decision on hospital admission versus home discharge?	
POPULATION:	Patients with suspected or confirmed COVID-19 and mild symptoms presenting to the healthcare system (e.g. emergency department)
INTERVENTION:	Chest imaging
COMPARISON:	No chest imaging
MAIN OUTCOMES:	1. Clinical outcomes • Mortality • Respiratory failure

	• Multiorgan failure
	• Shortness of breath
	• Recovery
	• Adverse effects of imaging (e.g., exposure to radiation)
	• COVID-19 transmission to health workers
	
	2. Health systems outcomes
	
	• Service use, including:
	  ○ Length of stay in Emergency Department
	  ○ Length of hospital stay
	  ○ Length of ICU stay
	• Availability of care
	• Access to care
	• Quality of care

SETTING:	Decision on hospital admission versus home discharge
PERSPECTIVE:	Societal perspective
BACKGROUND:	
CONFLICT OF INTERESTS:	

ASSESSMENT

Desirable Effects

How substantial are the desirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Trivial ○ Small ● Moderate ○ Large ○ Varies ○ Don't know	• **No study evaluated the effects of chest imaging on clinical outcomes** • **No study evaluated the effects of chest imaging on health systems outcomes**	• Risk stratifying patients • Higher risk for disease progression • Establishing definitive diagnosis • Artificial intelligence (AI) may be used in interpreting the results The voting results are: • Trivial: 0 • Small: 5

		• Moderate: 6 • Large: 5 • Varies: 0 • Don't know : 0

Undesirable Effects

How substantial are the undesirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Large ○ Moderate ● Small ○ Trivial ○ Varies ○ Don't know	• **No study evaluated the effects of chest imaging on clinical outcomes** • **No study evaluated the effects of chest imaging on health systems outcomes**	• Risk of radiation • Exposure of HCWs • The undesirable effects vary based on modality, might be less in chest xray • If portable chest x-ray available, harms would be lower in chest x-ray The voting results are: • Large: 2 • Moderate: 1 • Small: 9 • Trivial: 0 • Varies: 3 • Don't know : 0

Certainty of evidence

What is the overall certainty of the evidence of effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
● Very low ○ Low ○ Moderate ○ High ○ No included studies		• Very low for CT vs. no CT • Very low for CXR vs. no CXR • Very low for US vs. no US

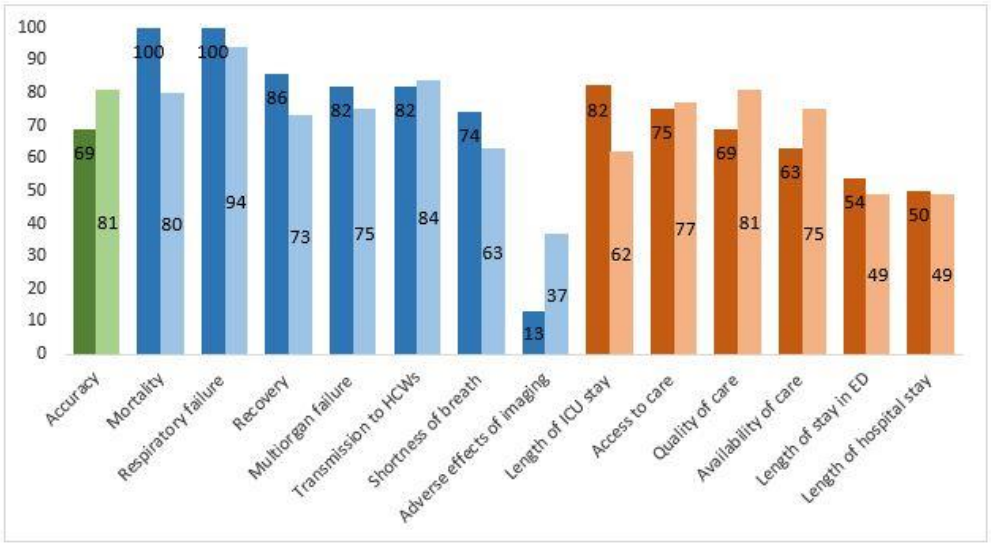
Values

Is there important uncertainty about or variability in how much people value the main outcomes?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Important uncertainty or variability ● Possibly important uncertainty or variability ○ Probably no important uncertainty or variability ○ No important uncertainty or variability	**Outcomes valuation (stakeholders n=249):**	The voting results are: • Important uncertainty or variability: 2 • Possibly important uncertainty or variability: 7 • Probably no important uncertainty or variability: 4 • No important uncertainty or variability: 1

Outcomes	Not important (%)		Important (%)		Critical (%)	
	GDG	Stakeholders	GDG	Stakeholders	GDG	Stakeholders
Accuracy	0	1	32	19	69	81
Mortality	0	6	0	16	100	80
Respiratory failure	0	4	0	4	100	94
Multiorgan failure	0	5	19	22	82	75
Shortness of breath	0	6	27	33	74	63
Recovery	0	4	15	25	86	73
Adverse effects of imaging	44	24	44	40	13	37
Transmission to HCWs	7	3	13	14	82	84
Length of stay in ED	14	12	34	40	54	49
Length of hospital stay	13	8	38	44	50	49
Length of ICU stay	0	4	19	36	82	62
Availability of care	0	4	38	23	63	75
Access to care	0	4	25	21	75	77
Quality of care	7	3	25	18	69	81

Critical outcomes (GDG, stakeholders n=249):



Green: accuracy of the diagnostic modality; blue: clinical outcomes; orange: health systems outcomes

Dark color: GDG; light color: stakeholders

	Stakeholder respondents (n=249) included: •members of the public (3%) •patients (2%) •physicians (22%) •technicians (53%) •other health professionals (5%) •researchers (3%) •policy-makers (3%) •other (7%)	

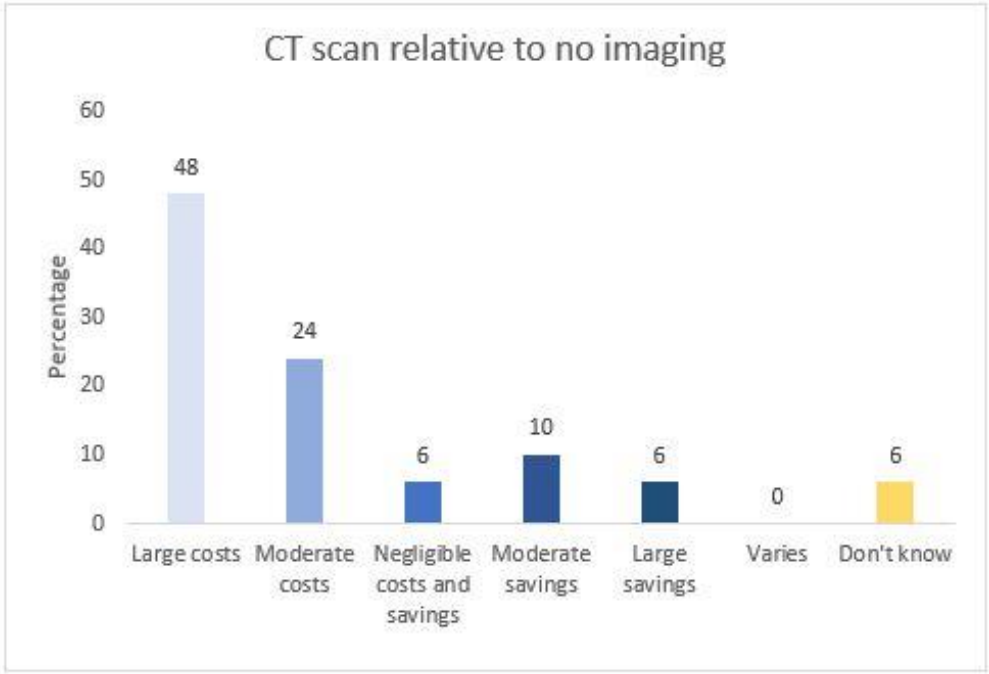
Balance of effects

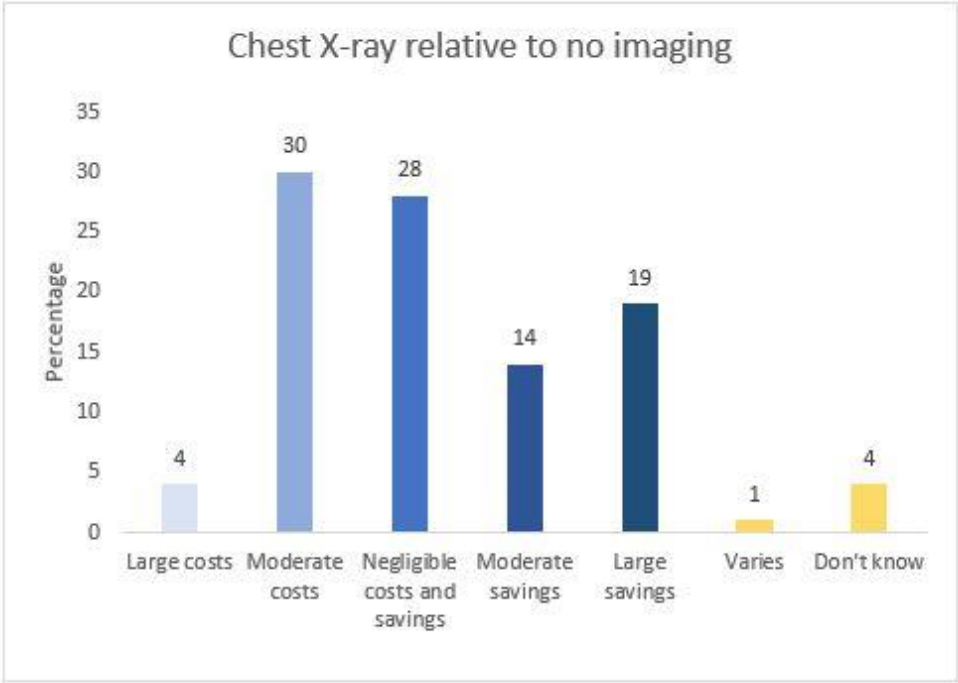
Does the balance between desirable and undesirable effects favor the intervention or the comparison?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Favors the comparison ○ Probably favors the comparison ○ Does not favor either the intervention or the comparison ● Probably favors the intervention ○ Favors the intervention ○ Varies ○ Don't know		The voting results are: • Favors the comparison: 1 • Probably favors the comparison: 0 • Does not favor either the intervention or the comparison: 0 • Probably favors the intervention: 11 • Favors the intervention : 2 • Varies: 0 • Don't know : 0

Resources required

How large are the resource requirements (costs)?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Large costs ● Moderate costs ○ Negligible costs and savings ○ Moderate savings ○ Large savings ○ Varies ○ Don't know		• Chest x-ray may be more feasible • opportunity cost diverting resources from evidence-based interventions • The cost might be high in certain settings i.e. the resources needed to book and conduct the test • The cost includes HCW protection, utilization of the space, transfer of patients and payment for expert reading • Part of the cost might be on patients The voting results are: • Large costs: 2 • Moderate costs: 10 • Negligible costs and savings: 0 • Moderate savings: 0 • Large savings: 0 • Varies: 2 • Don't know : 0


Chest X-ray relative to no imaging
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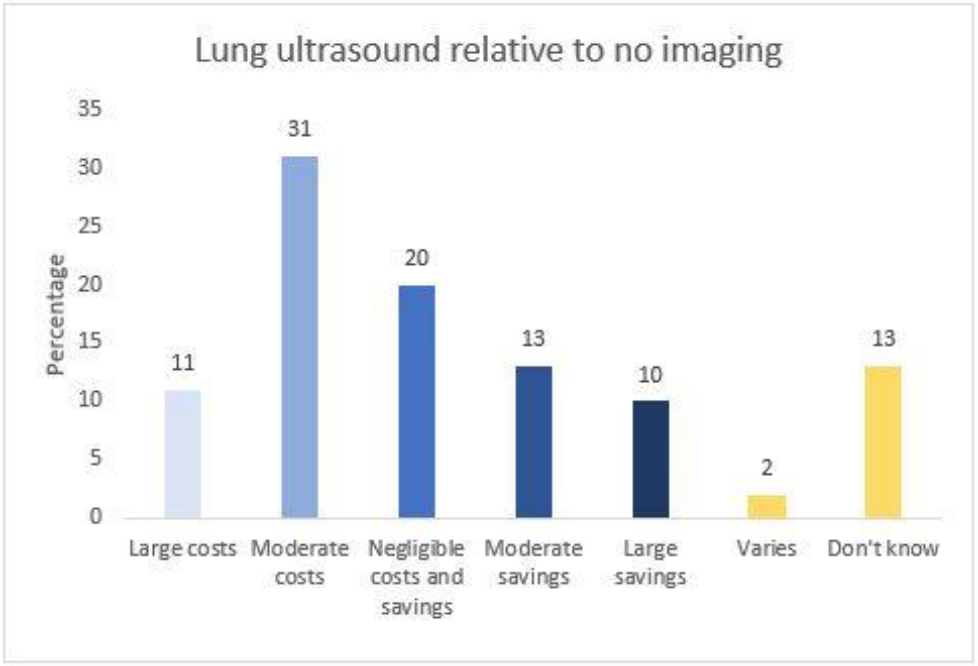
Negligible costs and savings
Moderate savings
Large savings
Varies
Don't know



Respondents (n=124) included:

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•physicians (16%)

•technicians (59%)

•other health professionals (4%)

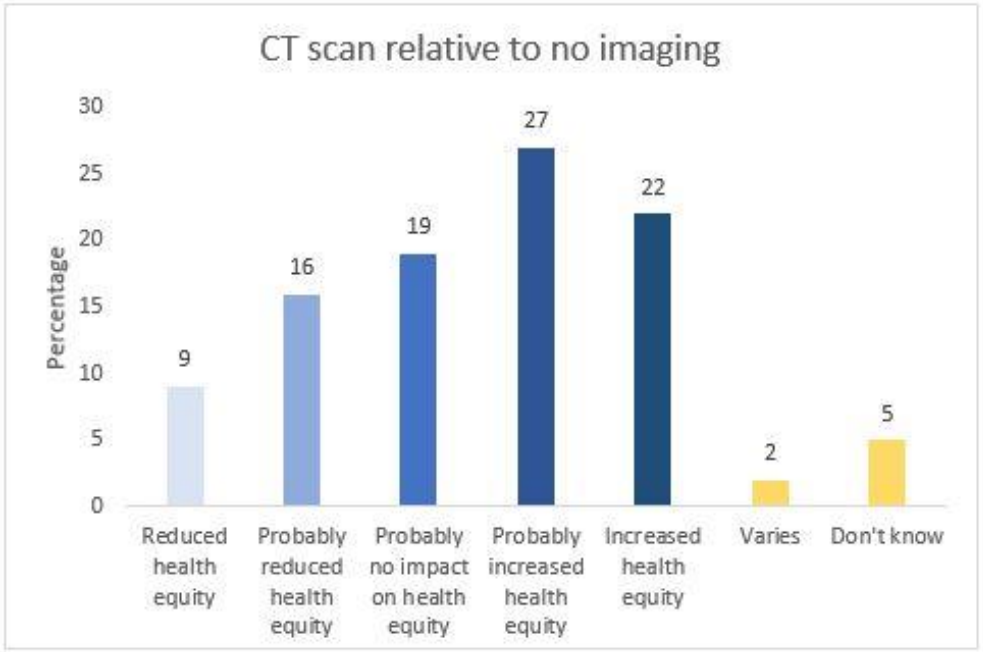
•researchers (4%)

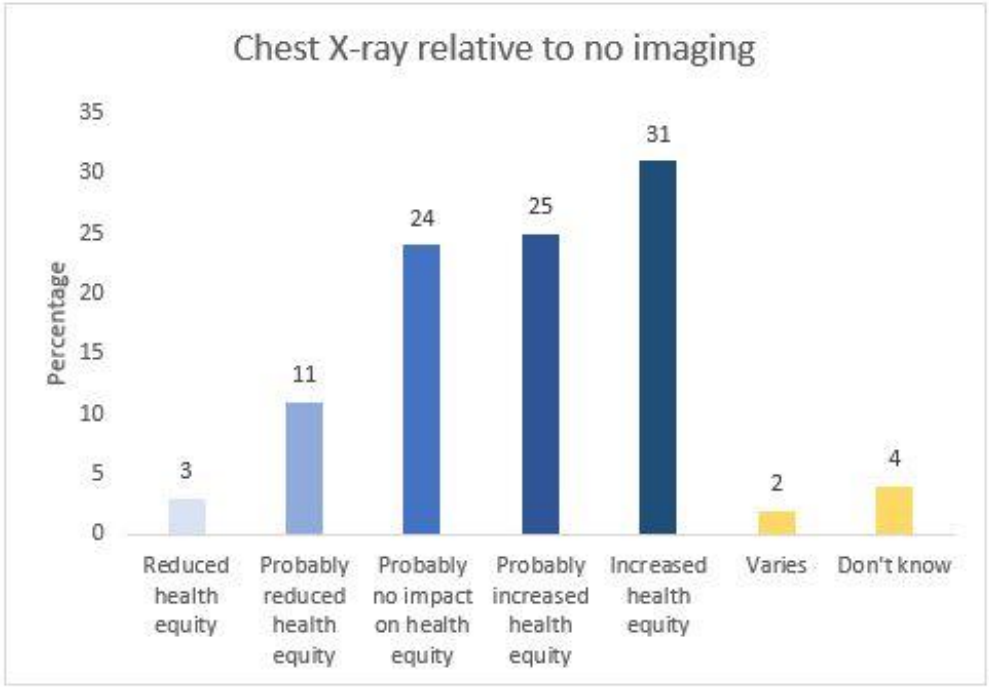
•policy-makers (4%)

•other (8%)

Equity

What would be the impact on health equity?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Reduced ● Probably reduced ○ Probably no impact ○ Probably increased ○ Increased ○ Varies ○ Don't know		• diversion of resources • Consider setting i.e. cities vs rural areas • people having to pay out of pocket The voting results are: • Reduced: 2 • Probably reduced: 8 • Probably no impact : 1 • Probably increased: 0 • Increased: 1 • Varies: 0 • Don't know : 0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Reduced health equity
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Probably increased health equity
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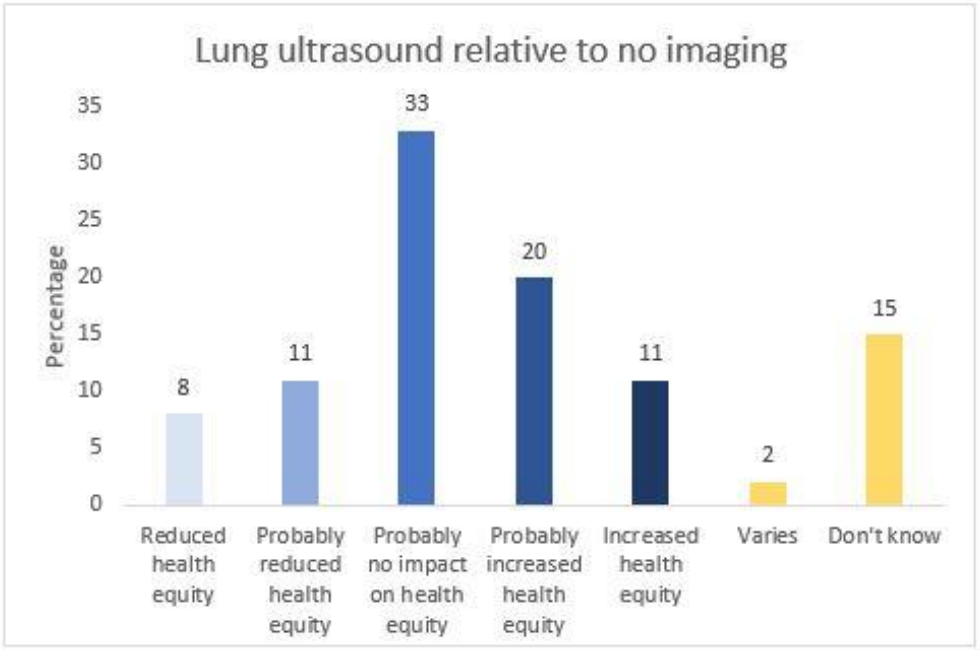
Varies
Don't know



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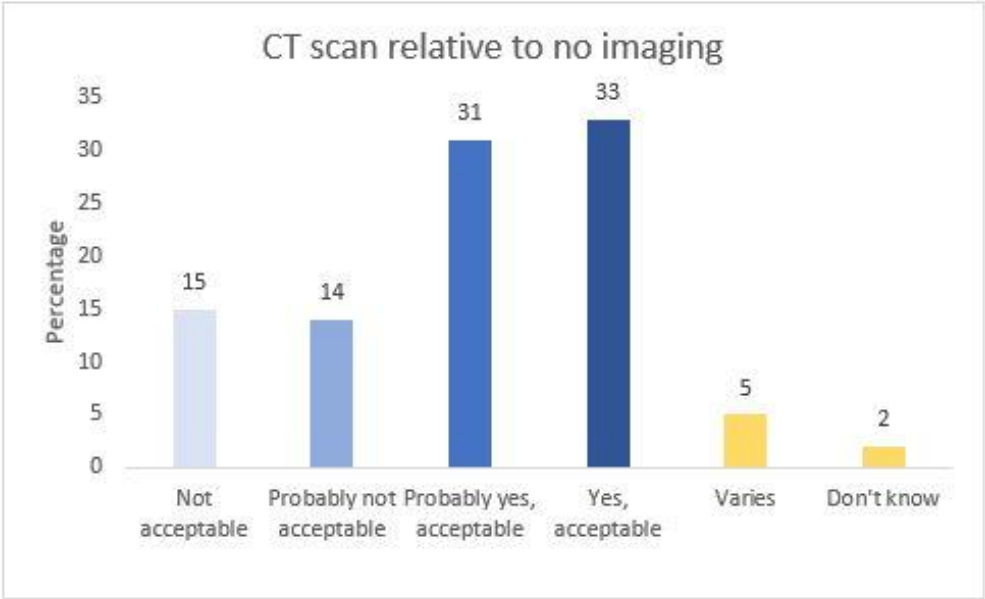
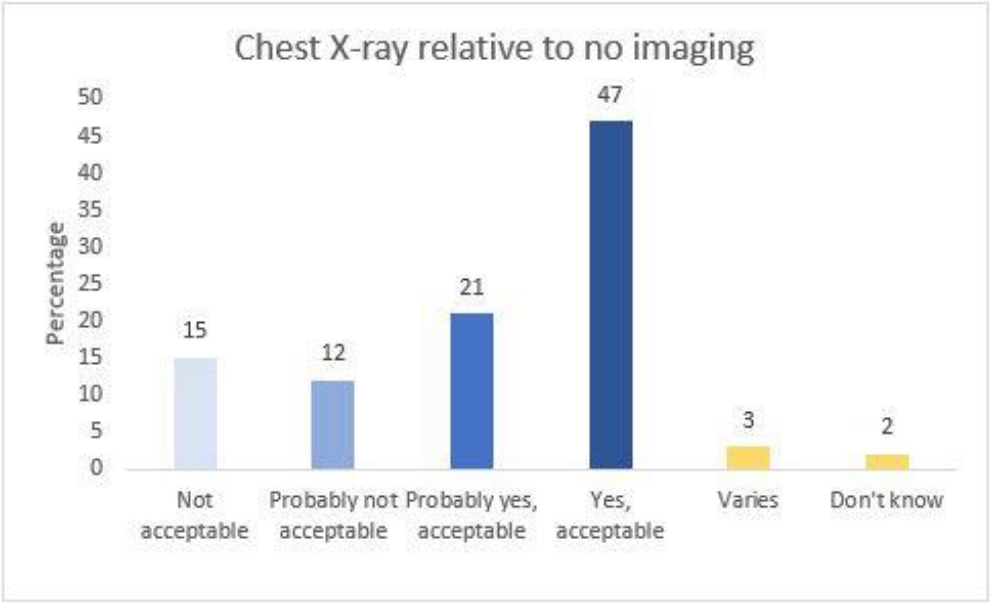
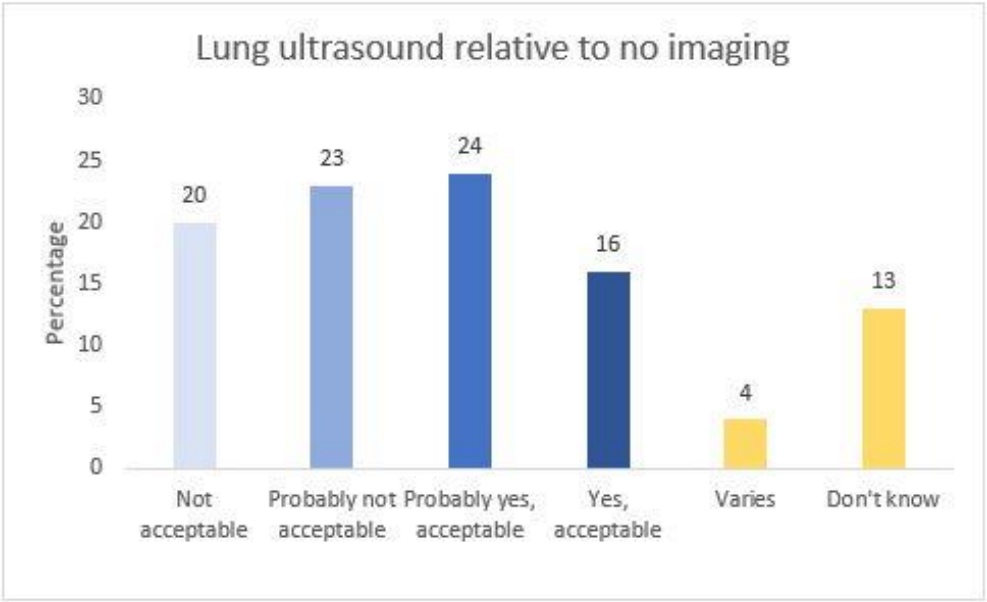
Acceptability

Is the intervention acceptable to key stakeholders?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know		• Providing information to patients is required • Consent would be ideal, but might not be feasible • Likely to be acceptable for patients, less likely to be acceptable to technicians • Varies by the administrator • Might be less acceptable to payers • Perform low-dose CT whenever possible The voting results are: • No : 0 • Probably no : 0 • Probably yes: 7 • Yes: 3 • Varies: 1 • Don't know : 0





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Feasibility

Is the intervention feasible to implement?

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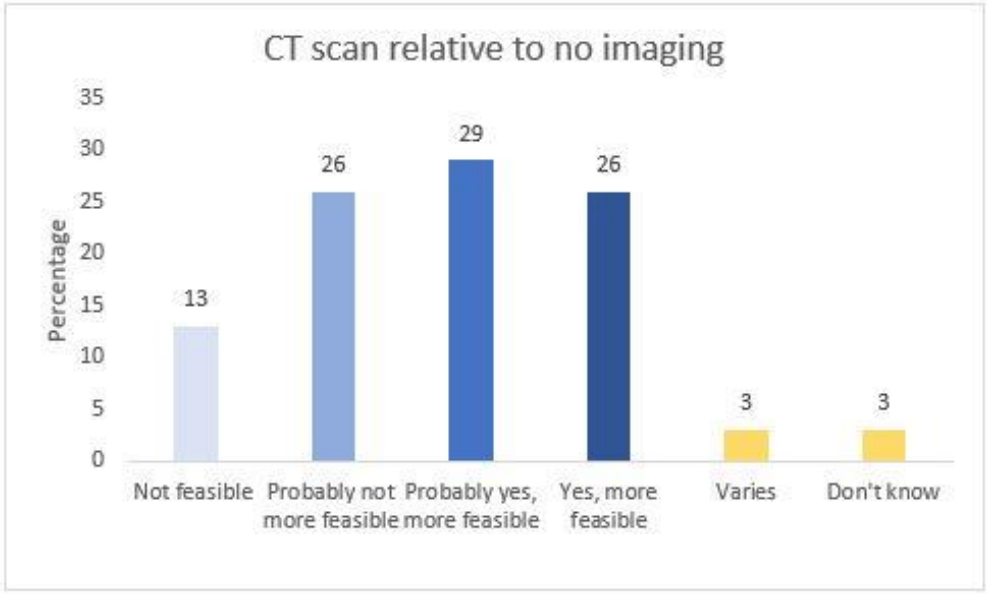
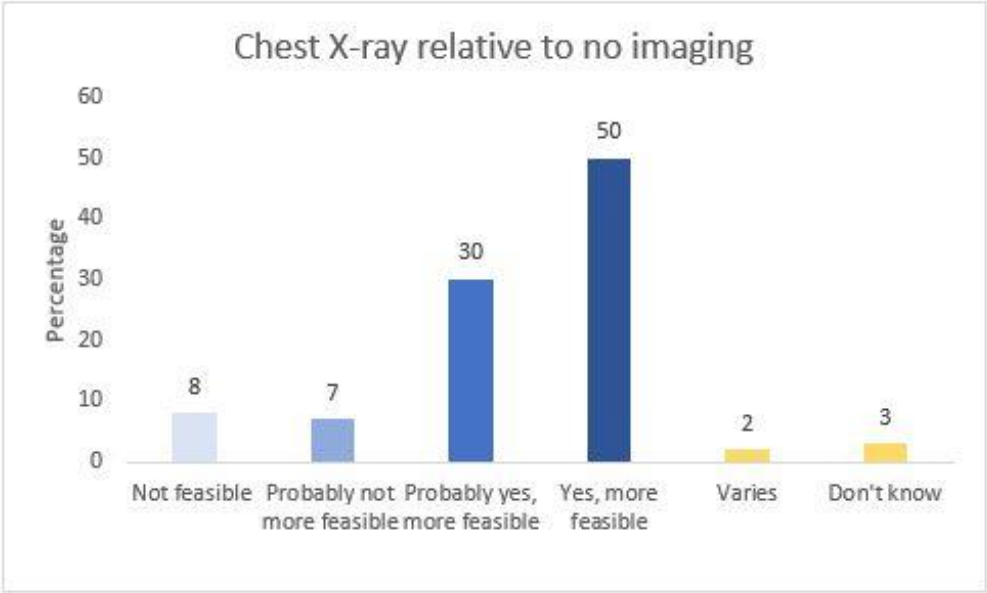
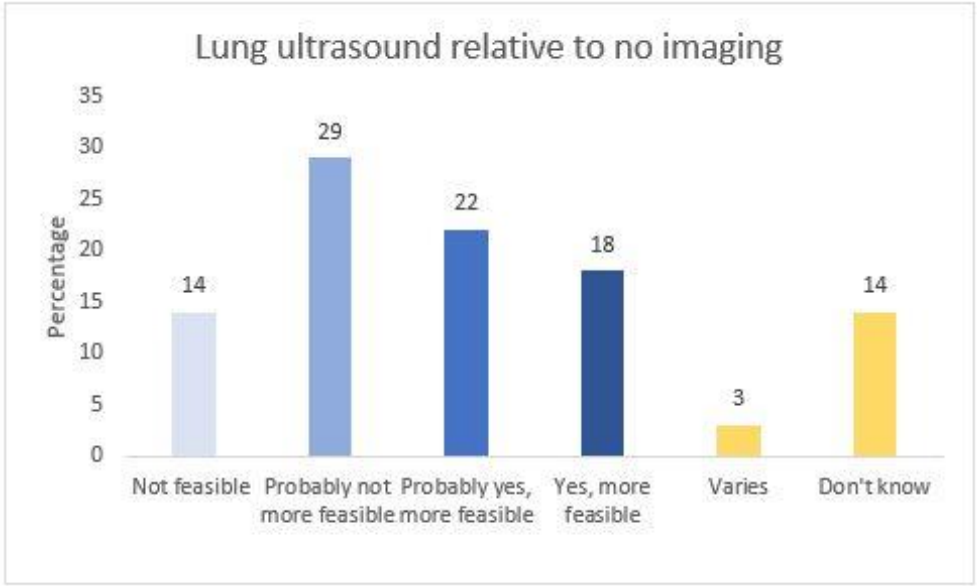
○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know		• Need to clean CT unit • Stop the non-urgent use of CT scan (issue of access and availability) • Availability of staff to interpret the scan (24/7) • Adapting the workflow in the CT room The voting results are: • No : 0 • Probably no : 0 • Probably yes: 6 • Yes: 3 • Varies: 0 • Don't know : 0





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SUMMARY OF JUDGEMENTS

	JUDGEMENT						
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UNDESIRABLE EFFECTS	Large	Moderate	**Small**	Trivial		Varies	Don't know
CERTAINTY OF EVIDENCE	**Very low**	Low	Moderate	High			No included studies
VALUES	Important uncertainty or variability	**Possibly important uncertainty or variability**	Probably no important uncertainty or variability	No important uncertainty or variability			
BALANCE OF EFFECTS	Favors the comparison	Probably favors the comparison	Does not favor either the intervention or the comparison	**Probably favors the intervention**	Favors the intervention	Varies	Don't know
RESOURCES REQUIRED	Large costs	**Moderate costs**	Negligible costs and savings	Moderate savings	Large savings	Varies	Don't know
EQUITY	Reduced	**Probably reduced**	Probably no impact	Probably increased	Increased	Varies	Don't know
ACCEPTABILITY	No	Probably no	**Probably yes**	Yes		Varies	Don't know
FEASIBILITY	No	Probably no	**Probably yes**	Yes		Varies	Don't know

TYPE OF RECOMMENDATION

Strong recommendation against the intervention	Conditional recommendation against the intervention	Conditional recommendation for either the intervention or the comparison	**Conditional recommendation for the intervention**	Strong recommendation for the intervention
○	○	○	●	○

CONCLUSIONS

Recommendation

For patients with suspected or confirmed COVID-19, not currently hospitalized and with mild symptoms, WHO **suggests using** chest imaging to support the decision on hospital admission versus home discharge (conditional recommendation, based on very low certainty evidence)

Remarks:

Patients likely to benefits are those who:

- are at high risk of disease progression
- are not responding to treatment

When choosing the imaging modality, consider the following:

- CT scan has the highest sensitivity and is preferred in patients with pre-existing pulmonary disease;
- Chest x-ray has a lower sensitivity but is associated with lower risk of HCW infection transmission; is less resource intensive; is associated with lower radiation doses than CT scan; and is easier to repeat sequentially for monitoring disease progression;
- LUS has limited evidence but is helpful with the appropriate expertise and can be done at the point of care. However, it requires closer physical proximity of the operator to the patient for a longer period of time and requires specific infection prevention and control precautions;
- Choice should consider the differential diagnosis in the specific case (e.g., CT angiography for pulmonary embolism, LUS for pleural effusions)
- Choice should be through a shared decision making involving the patient, the referrer physician and the radiologist;

The voting results are:

- Strong recommendation against the intervention: 0
- Conditional recommendation against the intervention: 1
- Conditional recommendation for either the intervention or the comparison: 0
- Conditional recommendation for the intervention: 9
- Strong recommendation for the intervention: 2

Justification

Subgroup considerations

Implementation considerations

Monitoring and evaluation

Research priorities

QUESTION (PICO 4)

Should chest imaging vs. no chest imaging be used for patients with suspected or confirmed COVID-19 and moderate to severe symptoms; context of a decision to choose between admission to regular ward vs. ICU?	
POPULATION:	Patients with suspected or confirmed COVID-19 and moderate to severe symptoms
INTERVENTION:	Chest imaging
COMPARISON:	No chest imaging
MAIN OUTCOMES:	1. Clinical outcomes • Mortality • Respiratory failure • Multiorgan failure • Shortness of breath • Recovery • Adverse effects of imaging (e.g., exposure to radiation)

	• COVID-19 transmission to health workers 2. Health systems outcomes • Service use, including: ○ Length of stay in Emergency Department ○ Length of hospital stay ○ Length of ICU stay • Availability of care • Access to care • Quality of care
SETTING:	Decision to choose between admission to regular ward vs. ICU
PERSPECTIVE:	Societal perspective
BACKGROUND:	
CONFLICT OF INTERESTS:	

ASSESSMENT

Desirable Effects

How substantial are the desirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Trivial ○ Small ● Moderate ○ Large ○ Varies ○ Don't know	• **No study evaluated the effects of chest imaging on clinical outcomes** • **No study evaluated the effects of chest imaging on health systems outcomes**	The voting results are: • Trivial: 0 • Small: 0 • Moderate: 6 • Large: 4 • Varies: 0 • Don't know : 0

Undesirable Effects

How substantial are the undesirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS

○ Large ○ Moderate ● Small ○ Trivial ○ Varies ○ Don't know	• **No study evaluated the effects of chest imaging on clinical outcomes** • **No study evaluated the effects of chest imaging on health systems outcomes**	The voting results are: • Large: 0 • Moderate: 2 • Small: 6 • Trivial: 1 • Varies: 0 • Don't know : 0

Certainty of evidence

What is the overall certainty of the evidence of effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
● Very low ○ Low ○ Moderate ○ High ○ No included studies		• Very low for CT vs. no CT • Very low for CXR vs. no CXR • Very low for US vs. no US

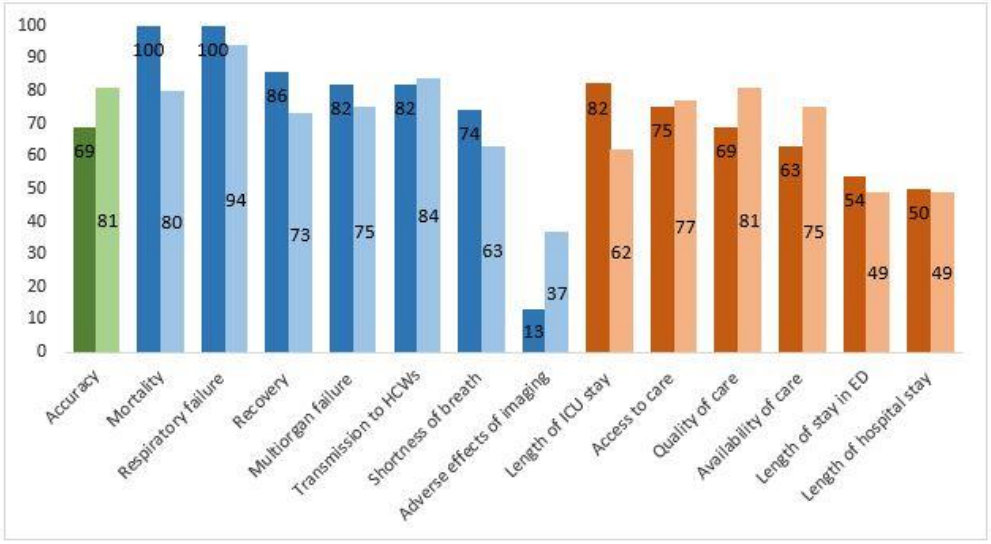
Values

Is there important uncertainty about or variability in how much people value the main outcomes?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Important uncertainty or variability ● Possibly important uncertainty or variability ○ Probably no important uncertainty or variability ○ No important uncertainty or variability	**Outcomes valuation (stakeholders n=249):**	The voting results are: • Important uncertainty or variability: 2 • Possibly important uncertainty or variability: 7 • Probably no important uncertainty or variability: 4 • No important uncertainty or variability: 1

Outcomes	Not important (%)		Important (%)		Critical (%)	
	GDG	Stakeholders	GDG	Stakeholders	GDG	Stakeholders
Accuracy	0	1	32	19	69	81
Mortality	0	6	0	16	100	80
Respiratory failure	0	4	0	4	100	94
Multiorgan failure	0	5	19	22	82	75
Shortness of breath	0	6	27	33	74	63
Recovery	0	4	15	25	86	73
Adverse effects of imaging	44	24	44	40	13	37
Transmission to HCWs	7	3	13	14	82	84
Length of stay in ED	14	12	34	40	54	49
Length of hospital stay	13	8	38	44	50	49
Length of ICU stay	0	4	19	36	82	62
Availability of care	0	4	38	23	63	75
Access to care	0	4	25	21	75	77
Quality of care	7	3	25	18	69	81

Critical outcomes (GDG, stakeholders n=249):



Green: accuracy of the diagnostic modality; blue: clinical outcomes; orange: health systems outcomes

Dark color: GDG; light color: stakeholders

Stakeholder respondents (n=249) included:

•members of the public (3%)

•patients (2%)

•physicians (22%)

•technicians (53%)

•other health professionals (5%)

•researchers (3%)

•policy-makers (3%)

•other (7%)

Balance of effects

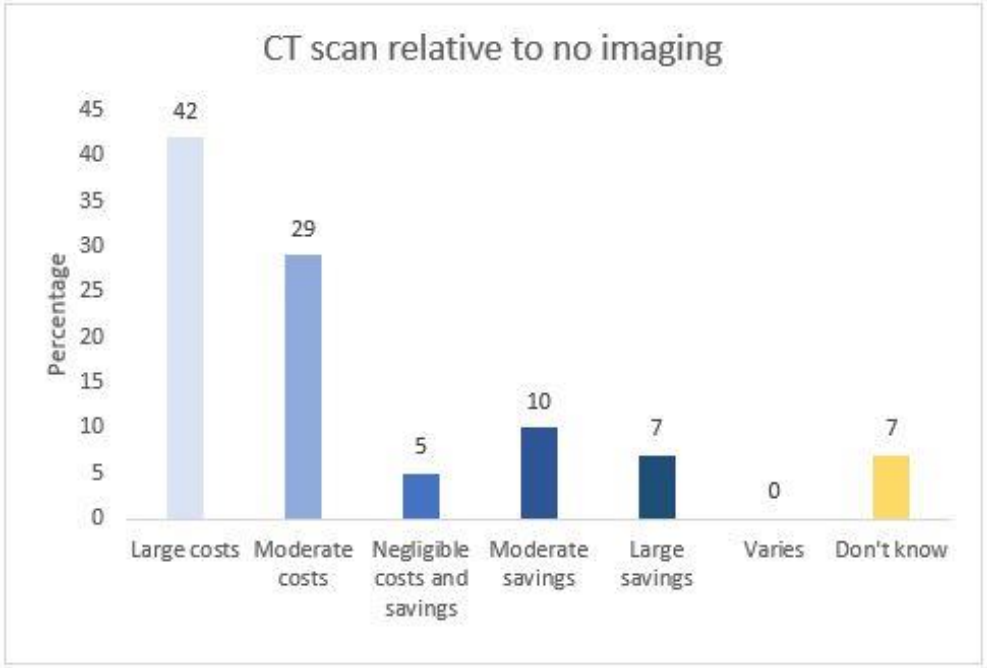
Does the balance between desirable and undesirable effects favor the intervention or the comparison?

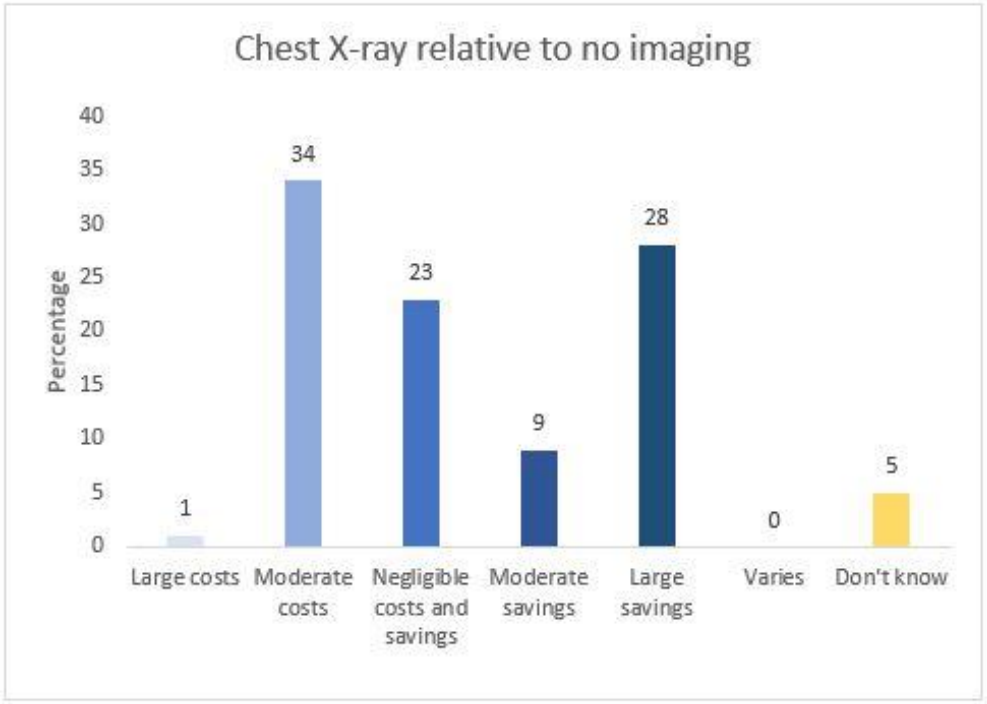
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Favors the comparison ○ Probably favors the comparison ○ Does not favor either the intervention or the comparison ● Probably favors the intervention ○ Favors the intervention ○ Varies ○ Don't know		The voting results are: • Favors the comparison: 0 • Probably favors the comparison: 0 • Does not favor either the intervention or the comparison: 1 • Probably favors the intervention: 6 • Favors the intervention : 4 • Varies: 0 • Don't know: 0

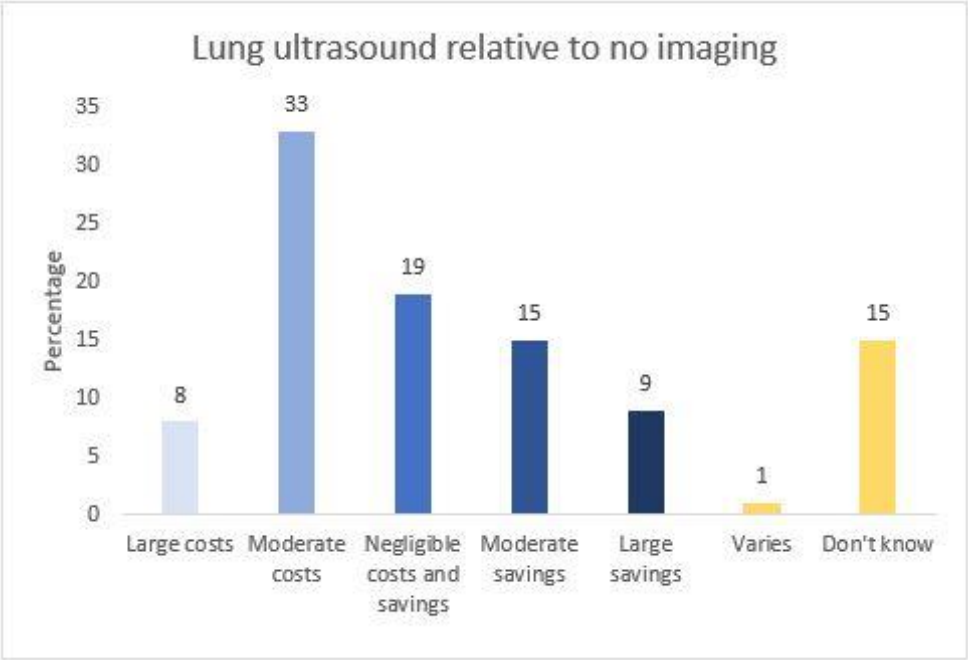
Resources required

How large are the resource requirements (costs)?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Large costs ● Moderate costs ○ Negligible costs and savings ○ Moderate savings ○ Large savings ○ Varies ○ Don't know		The voting results are: • Large costs: 2 • Moderate costs: 8 • Negligible costs and savings: 0 • Moderate savings: 1 • Large savings: 0 • Varies: 0 • Don't know : 0


CT scan relative to no imaging
Percentage
45
40
35
30
25
20
15
10
5
0
42
29
5
10
7
0
7
Large costs
Moderate costs
Negligible costs and savings
Moderate savings
Large savings
Varies
Don't know


Chest X-ray relative to no imaging
Percentage
40
35
30
25
20
15
10
5
0
1
34
23
9
28
0
5
Large costs
Moderate costs
Negligible costs and savings
Moderate savings
Large savings
Varies
Don't know

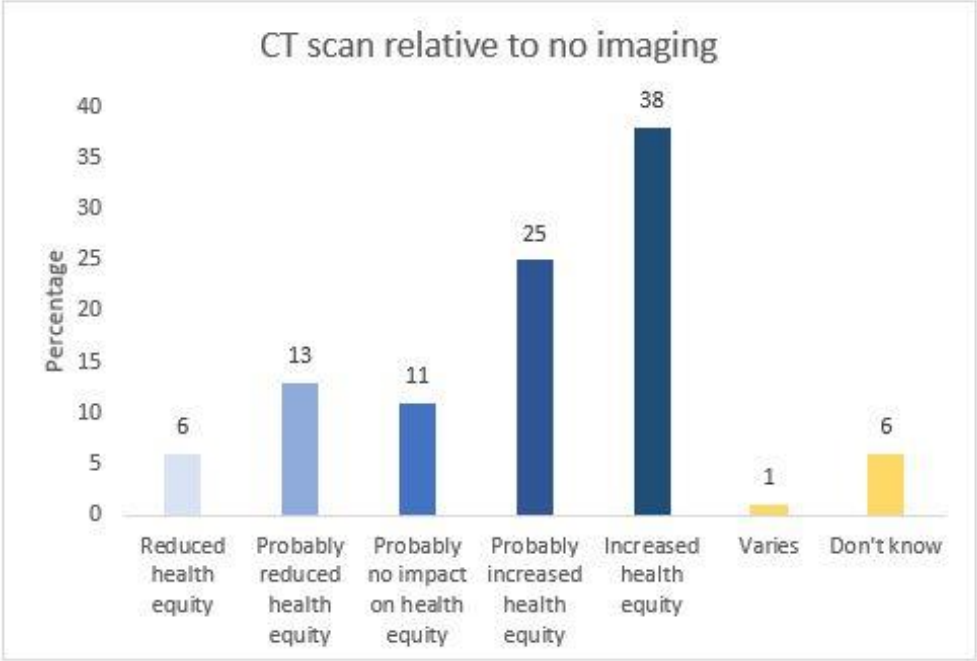


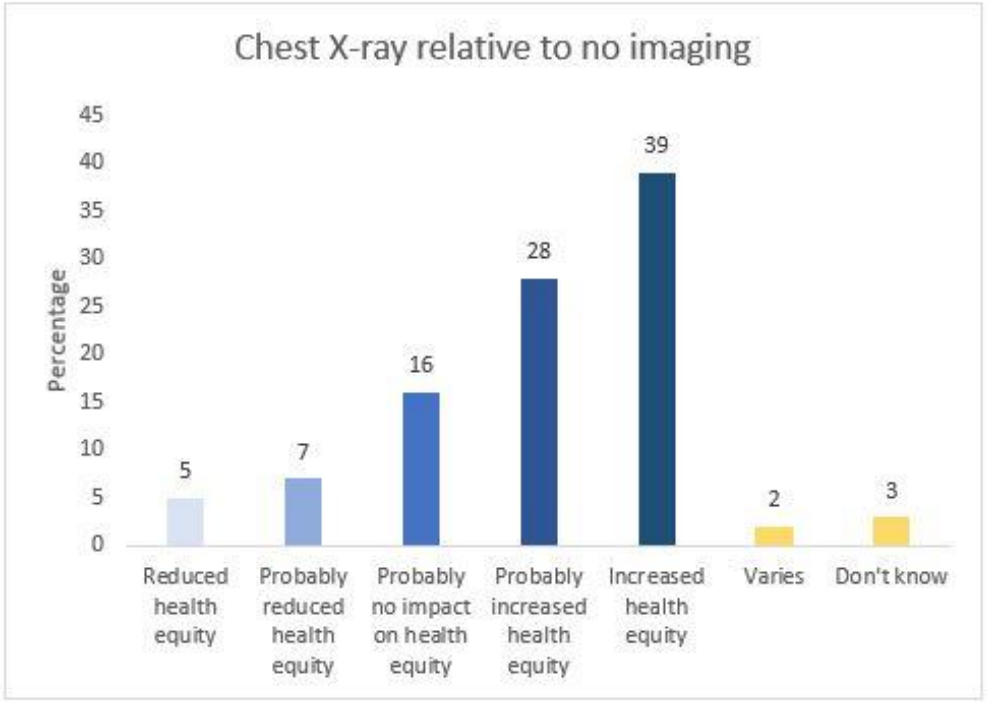
Respondents (n=93) included:

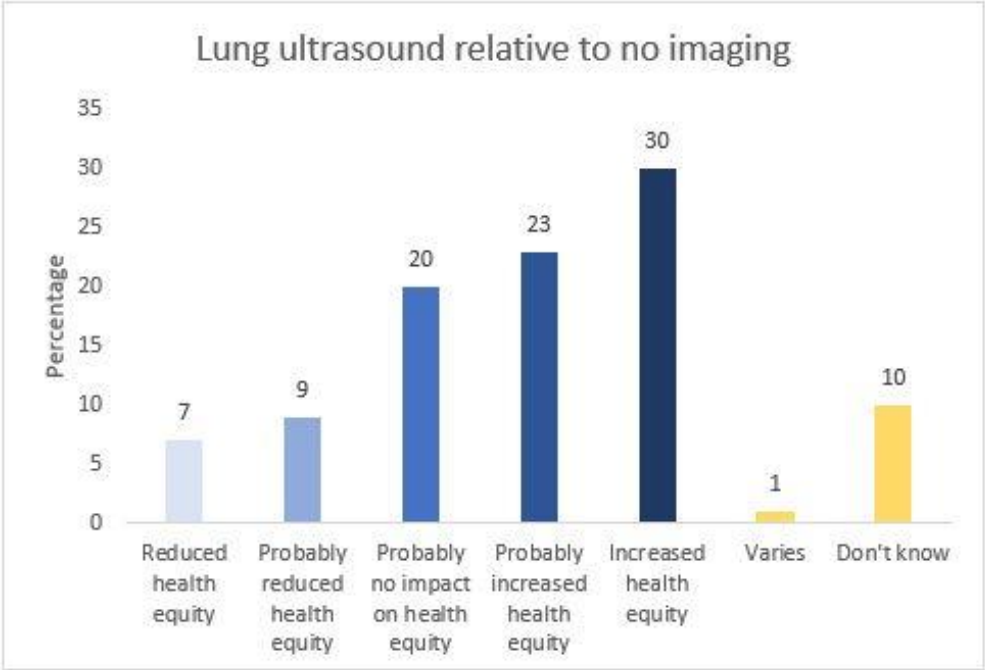
- members of the public (2%)
- patients (3%)
- physicians (14%)
- technicians (61%)
- other health professionals (4%)
- researchers (5%)
- policy-makers (3%)
- other (8%)

Equity

What would be the impact on health equity?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Reduced ● Probably reduced ○ Probably no impact ○ Probably increased ○ Increased ○ Varies ○ Don't know		The voting results are: • Reduced: 0 • Probably reduced: 8 • Probably no impact : 3 • Probably increased: 0 • Increased: 0 • Varies: 0 • Don't know : 0


Chest X-ray relative to no imaging
Percentage
45
40
35
30
25
20
15
10
5
0
5
7
16
28
39
2
3
Reduced health equity
Probably reduced health equity
Probably no impact on health equity
Probably increased health equity
Increased health equity
Varies
Don't know



Respondents (n=93) included:

•members of the public (2%)

•patients (3%)

•physicians (14%)

•technicians (61%)

•other health professionals (4%)

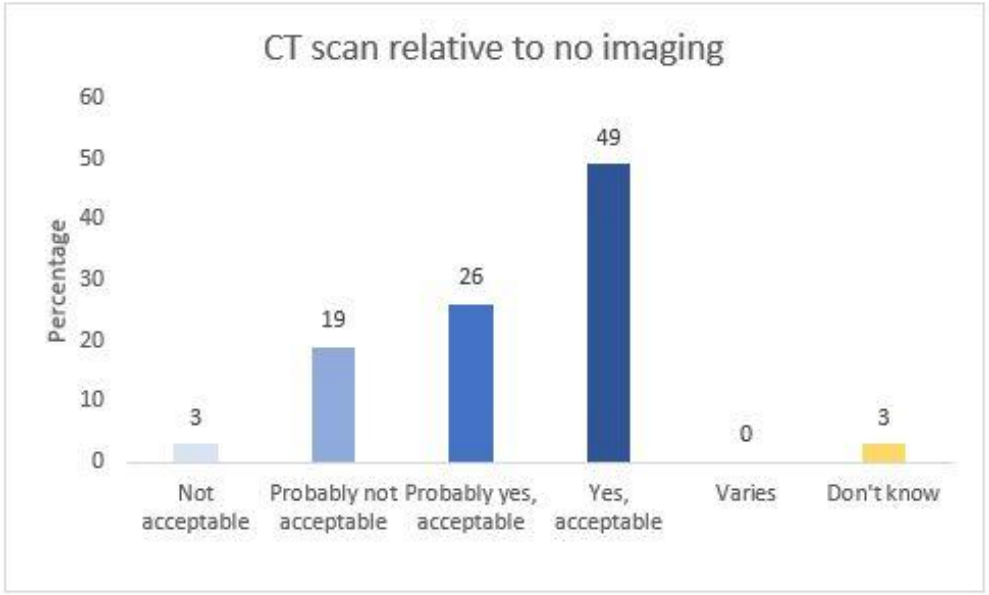
•researchers (5%)

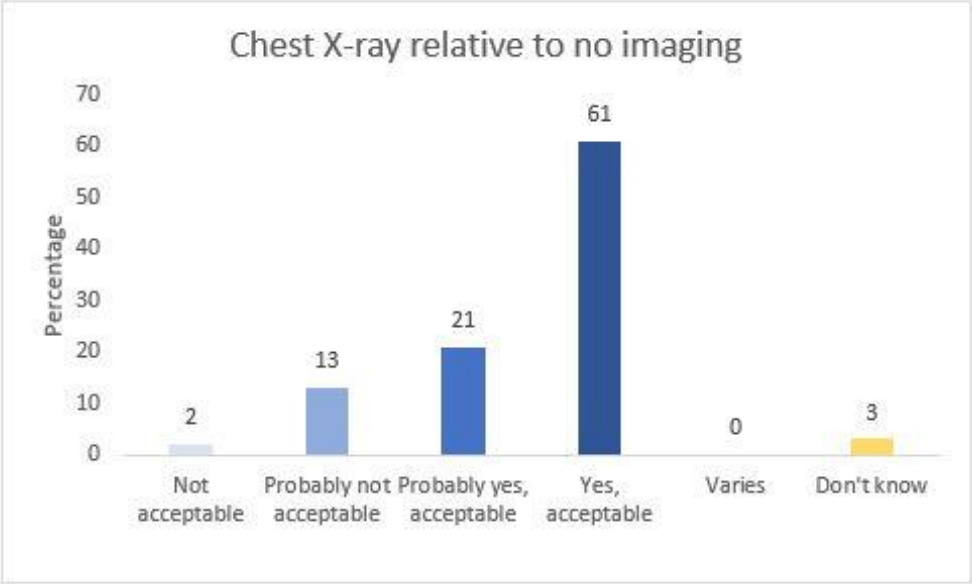
•policy-makers (3%)

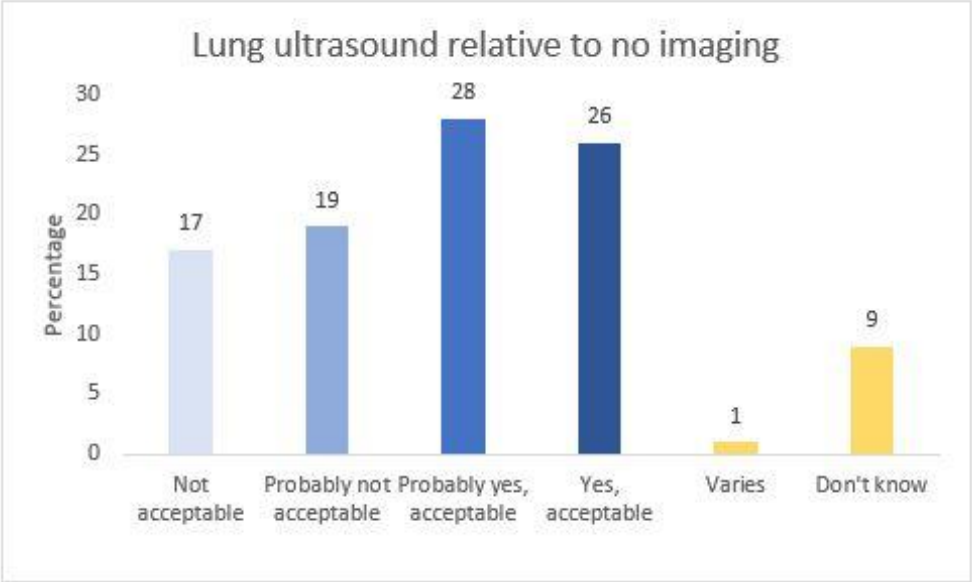
•other (8%)

Acceptability

Is the intervention acceptable to key stakeholders?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know		The voting results are: • No : 0 • Probably no : 1 • Probably yes: 7 • Yes: 2 • Varies: 0 • Don't know : 0





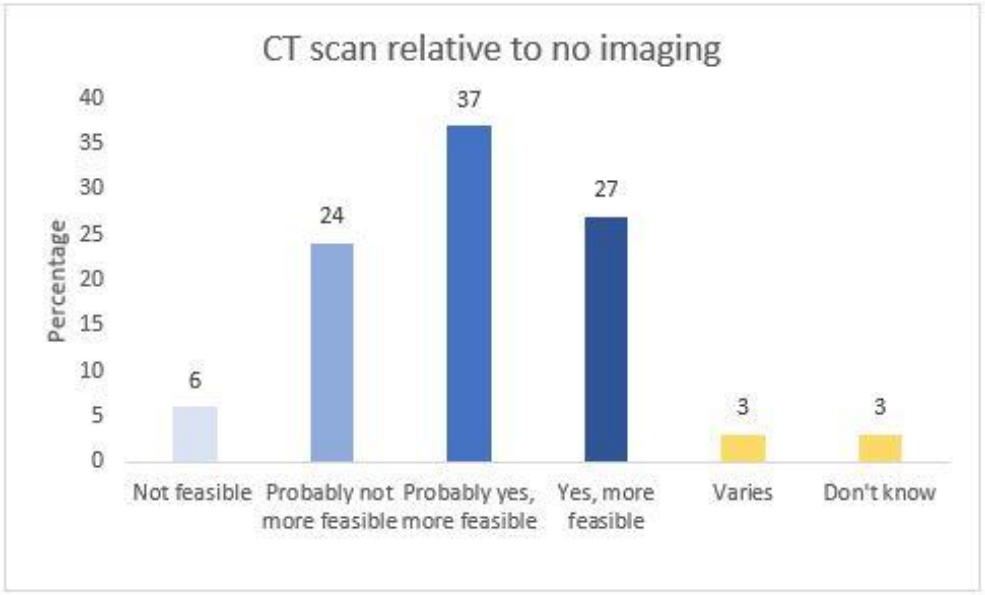
Respondents (n=93) included:

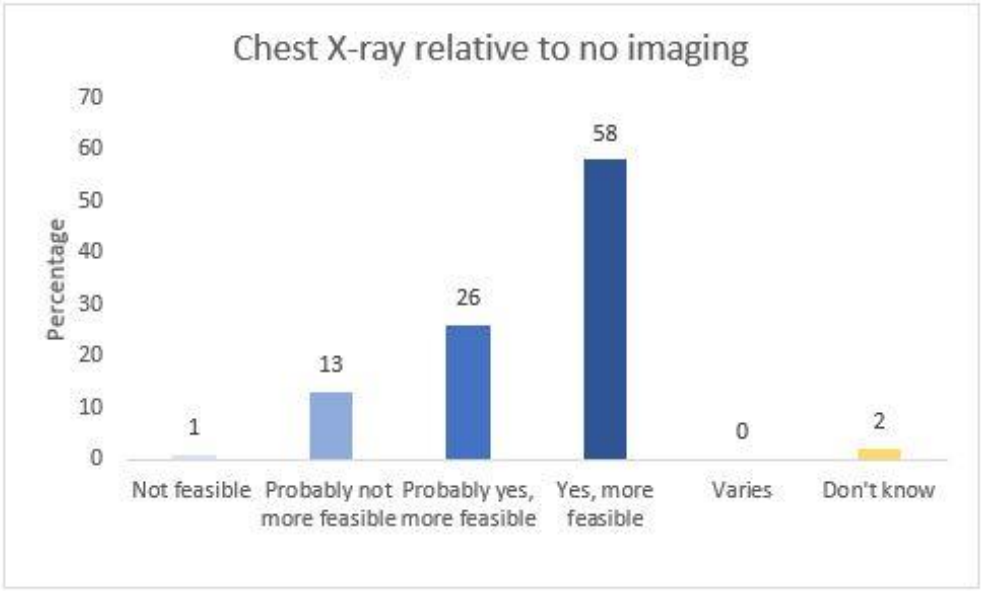
•members of the public (2%)

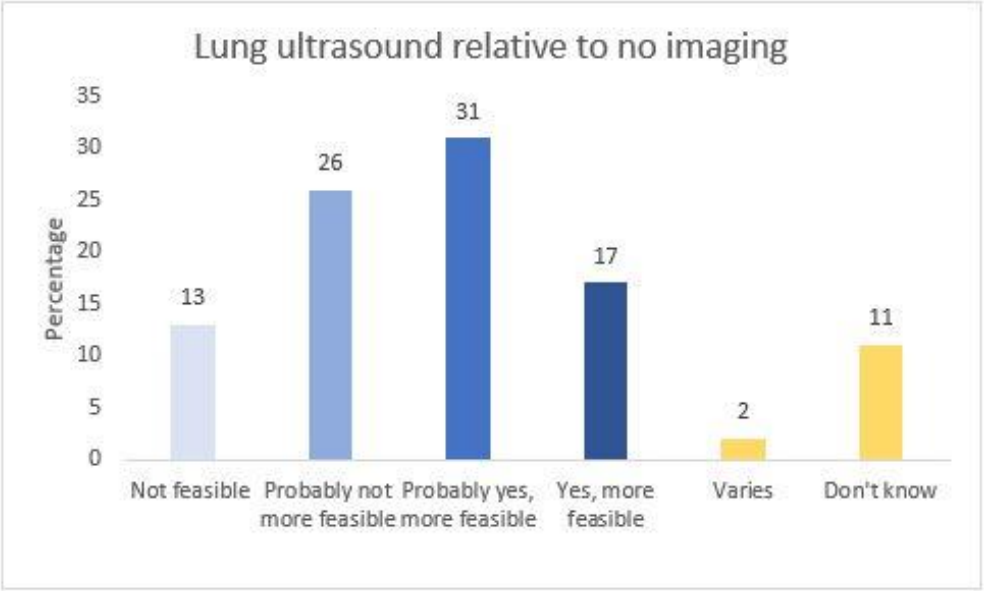
	•patients (3%) •physicians (14%) •technicians (61%) •other health professionals (4%) •researchers (5%) •policy-makers (3%) •other (8%)	

Feasibility

Is the intervention feasible to implement?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know		The voting results are: • No : 0 • Probably no : 1 • Probably yes: 9 • Yes: 2 • Varies: 0 • Don't know : 0





Respondents (n=93) included:

•members of the public (2%)

	•patients (3%) •physicians (14%) •technicians (61%) •other health professionals (4%) •researchers (5%) •policy-makers (3%) •other (8%)	

SUMMARY OF JUDGEMENTS

	JUDGEMENT						
DESIRABLE EFFECTS	Trivial	Small	**Moderate**	Large		Varies	Don't know
UNDESIRABLE EFFECTS	Large	Moderate	**Small**	Trivial		Varies	Don't know
CERTAINTY OF EVIDENCE	**Very low**	Low	Moderate	High			No included studies
VALUES	Important uncertainty or variability	**Possibly important uncertainty or variability**	Probably no important uncertainty or variability	No important uncertainty or variability			
BALANCE OF EFFECTS	Favors the comparison	Probably favors the comparison	Does not favor either the intervention or the comparison	**Probably favors the intervention**	Favors the intervention	Varies	Don't know
RESOURCES REQUIRED	Large costs	**Moderate costs**	Negligible costs and savings	Moderate savings	Large savings	Varies	Don't know
EQUITY	Reduced	**Probably reduced**	Probably no impact	Probably increased	Increased	Varies	Don't know
ACCEPTABILITY	No	Probably no	**Probably yes**	Yes		Varies	Don't know
FEASIBILITY	No	Probably no	**Probably yes**	Yes		Varies	Don't know

TYPE OF RECOMMENDATION

Strong recommendation against the intervention	Conditional recommendation against the intervention	Conditional recommendation for either the intervention or the comparison	**Conditional recommendation for the intervention**	Strong recommendation for the intervention
○	○	○	●	○

CONCLUSIONS

Recommendation

For patients with suspected or confirmed COVID-19, not currently hospitalized and with moderate to severe symptoms, WHO **suggests using** chest imaging to support the decision on regular ward admission versus intensive care unit admission (conditional recommendation, based on very low certainty evidence)

Remarks:

Patients likely to benefits are those who:

- are at high risk of disease progression
- are not responding to treatment

When choosing the imaging modality, consider the following:

- CT scan has the highest sensitivity and is preferred in patients with pre-existing pulmonary disease;
- Chest x-ray has a lower sensitivity but is associated with lower risk of HCW infection transmission; is less resource intensive; is associated with lower radiation doses than CT scan; and is easier to repeat sequentially for monitoring disease progression;
- LUS has limited evidence but is helpful with the appropriate expertise and can be done at the point of care. However, it requires closer physical proximity of the operator to the patient for a longer period of time and requires specific infection prevention and control precautions;
- Choice should consider the differential diagnosis in the specific case (e.g., CT angiography for pulmonary embolism, LUS for pleural effusions)
- Choice should be through a shared decision making involving the patient, the referrer physician and the radiologist;

The voting results are:

- Strong recommendation against the intervention: 0
- Conditional recommendation against the intervention: 0
- Conditional recommendation for either the intervention or the comparison: 0
- Conditional recommendation for the intervention: 8
- Strong recommendation for the intervention: 3

Justification

Subgroup considerations

Implementation considerations

Monitoring and evaluation

Research priorities

QUESTION (PICO 5)

Should chest imaging vs. no chest imaging be used for patients with suspected or confirmed COVID-19, currently hospitalized and moderate or severe symptoms; context of a decision to choose whether to escalate respiratory support?	
POPULATION:	Patients with suspected or confirmed COVID-19, currently hospitalized and moderate or severe symptoms
INTERVENTION:	Chest imaging
COMPARISON:	No chest imaging
MAIN OUTCOMES:	1. Clinical outcomes • Mortality • Respiratory failure • Multiorgan failure • Shortness of breath • Recovery • Adverse effects of imaging (e.g., exposure to radiation) • COVID-19 transmission to health workers 2. Health systems outcomes • Service use, including: ○ Length of stay in Emergency Department ○ Length of hospital stay ○ Length of ICU stay • Availability of care • Access to care • Quality of care
SETTING:	Decision to choose whether to escalate respiratory support
PERSPECTIVE:	Societal perspective
BACKGROUND:	
CONFLICT OF INTERESTS:	

ASSESSMENT

Desirable Effects

How substantial are the desirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Trivial ○ Small ● Moderate ○ Large ○ Varies ○ Don't know	• **No study evaluated the effects of chest imaging on clinical outcomes** • **No study evaluated the effects of chest imaging on health systems outcomes**	The voting results are: • Trivial: 0 • Small: 1 • Moderate: 5 • Large: 3 • Varies: 1 • Don't know : 0

Undesirable Effects

How substantial are the undesirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Large ○ Moderate ● Small ○ Trivial ○ Varies ○ Don't know	• **No study evaluated the effects of chest imaging on clinical outcomes** • **No study evaluated the effects of chest imaging on health systems outcomes**	The voting results are: • Large: 0 • Moderate: 2 • Small: 7 • Trivial: 2 • Varies: 0 • Don't know : 0

Certainty of evidence

What is the overall certainty of the evidence of effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
● Very low ○ Low ○ Moderate ○ High ○ No included studies		• Very low for CT vs. no CT • Very low for CXR vs. no CXR • Very low for US vs. no US

Values

Is there important uncertainty about or variability in how much people value the main outcomes?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Important uncertainty or variability ● Possibly important uncertainty or variability ○ Probably no important uncertainty or variability ○ No important uncertainty or variability	**Outcomes valuation (stakeholders n=249):**	The voting results are: • Important uncertainty or variability: 2 • Possibly important uncertainty or variability: 7 • Probably no important uncertainty or variability: 4 • No important uncertainty or variability: 1

Outcomes	Not important (%)		Important (%)		Critical (%)	
	GDG	Stakeholders	GDG	Stakeholders	GDG	Stakeholders
Accuracy	0	1	32	19	69	81
Mortality	0	6	0	16	100	80
Respiratory failure	0	4	0	4	100	94
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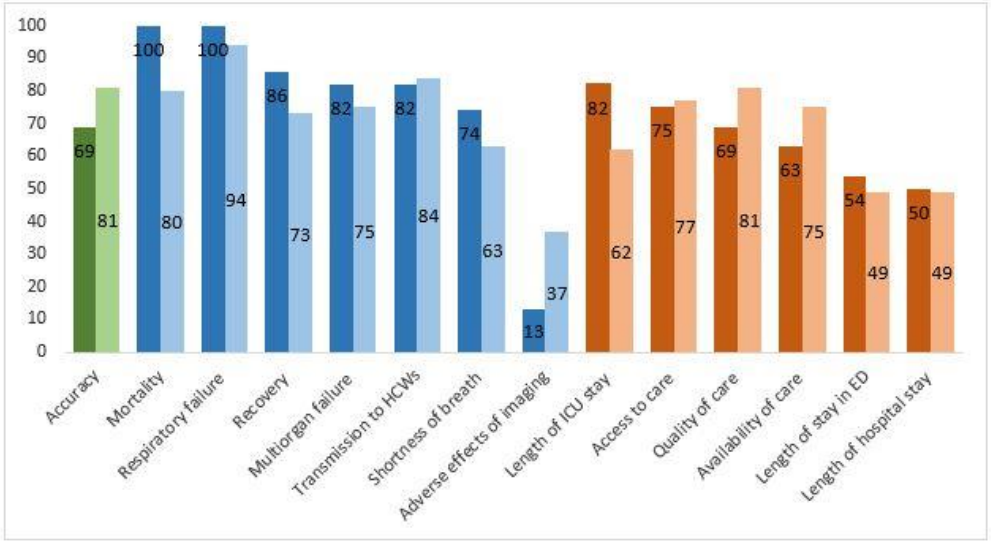
Critical outcomes (GDG, stakeholders n=249):



Green: accuracy of the diagnostic modality; blue: clinical outcomes; orange: health systems outcomes

Dark color: GDG; light color: stakeholders

Stakeholder respondents (n=249) included:

•members of the public (3%)

•patients (2%)

•physicians (22%)

•technicians (53%)

•other health professionals (5%)

•researchers (3%)

•policy-makers (3%)

•other (7%)

Balance of effects

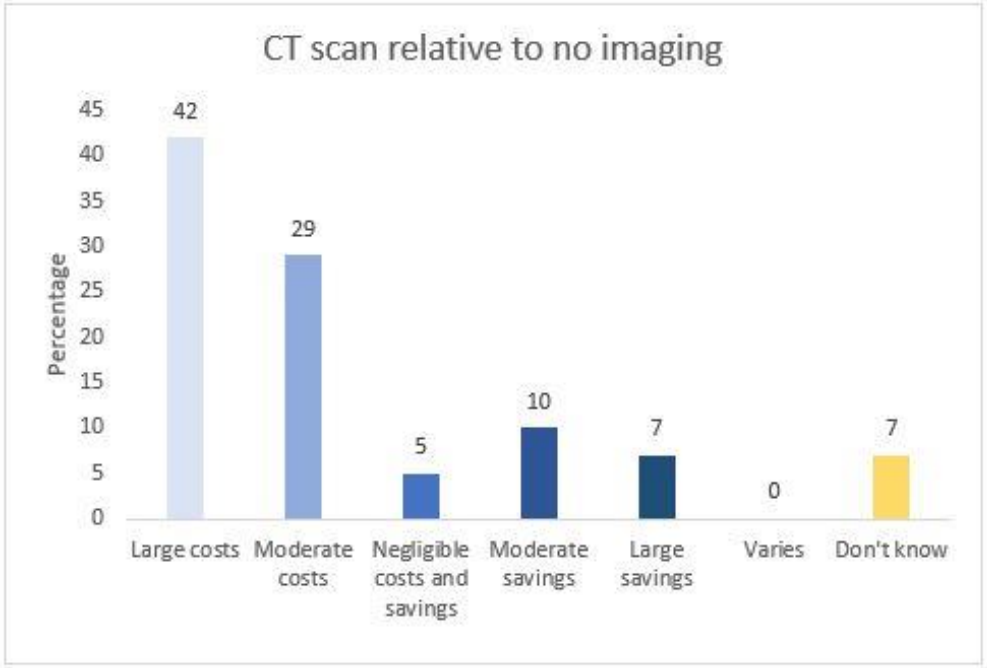
Does the balance between desirable and undesirable effects favor the intervention or the comparison?

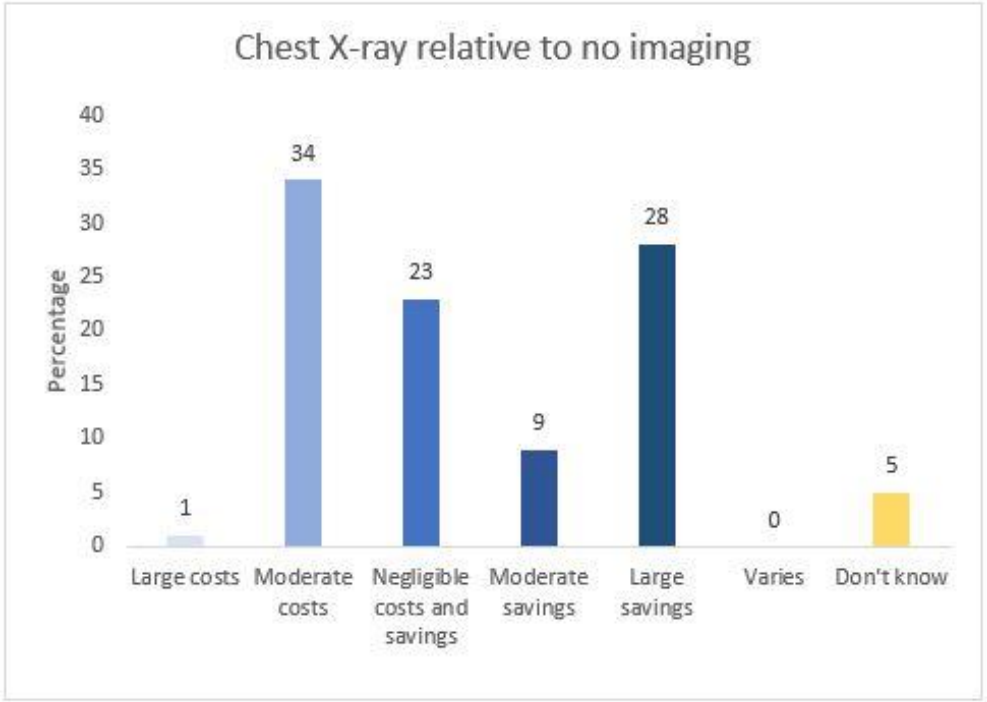
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Favors the comparison ○ Probably favors the comparison ○ Does not favor either the intervention or the comparison ● Probably favors the intervention ○ Favors the intervention ○ Varies ○ Don't know		The voting results are: • Favors the comparison: 0 • Probably favors the comparison: 1 • Does not favor either the intervention or the comparison: 1 • Probably favors the intervention: 8 • Favors the intervention : 1 • Varies: 0 • Don't know : 0

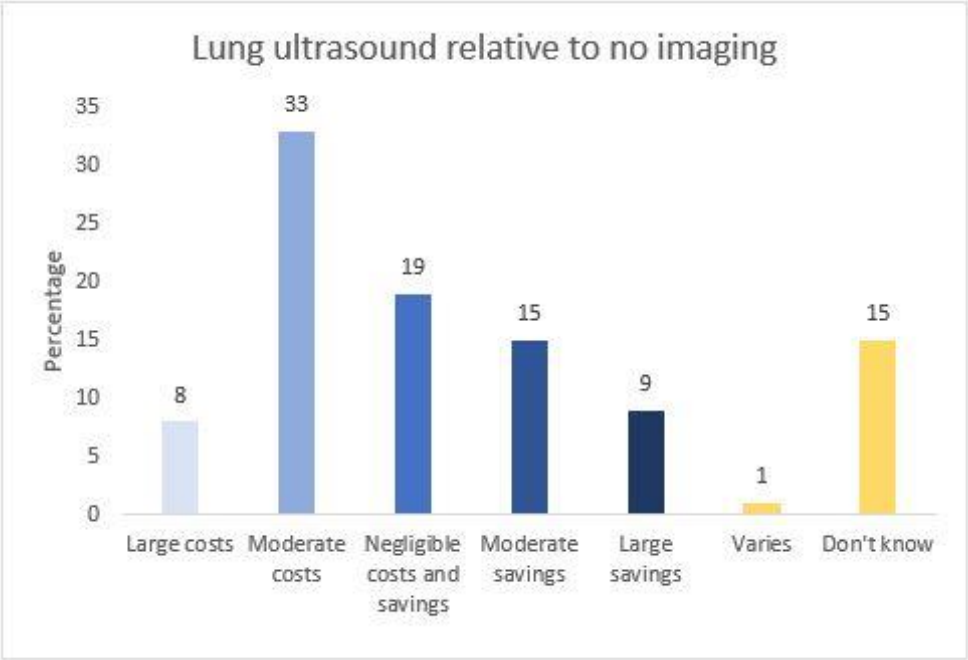
Resources required

How large are the resource requirements (costs)?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Large costs ● Moderate costs ○ Negligible costs and savings ○ Moderate savings ○ Large savings ○ Varies ○ Don't know		The voting results are: • Large costs: 1 • Moderate costs: 8 • Negligible costs and savings: 0 • Moderate savings: 1 • Large savings: 0 • Varies: 1 • Don't know : 0

	 CT scan relative to no imaging Percentage 45 40 35 30 25 20 15 10 5 0 42 29 5 10 7 0 7 Large costs Moderate costs Negligible costs and savings Moderate savings Large savings Varies Don't know	


Chest X-ray relative to no imaging
Percentage
40
35
30
25
20
15
10
5
0
1
34
23
9
28
0
5
Large costs
Moderate costs
Negligible costs and savings
Moderate savings
Large savings
Varies
Don't know



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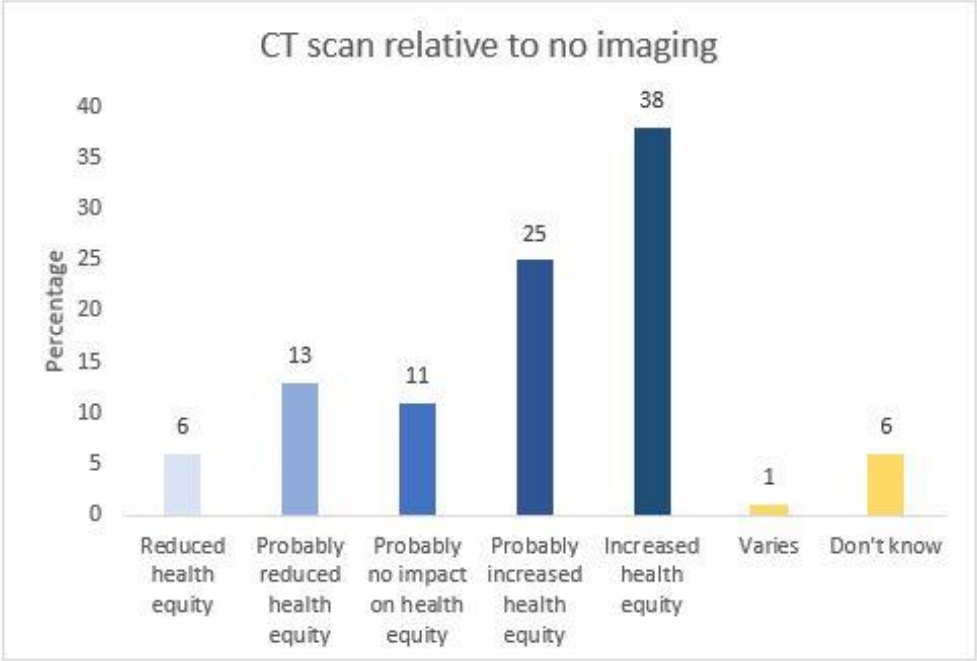
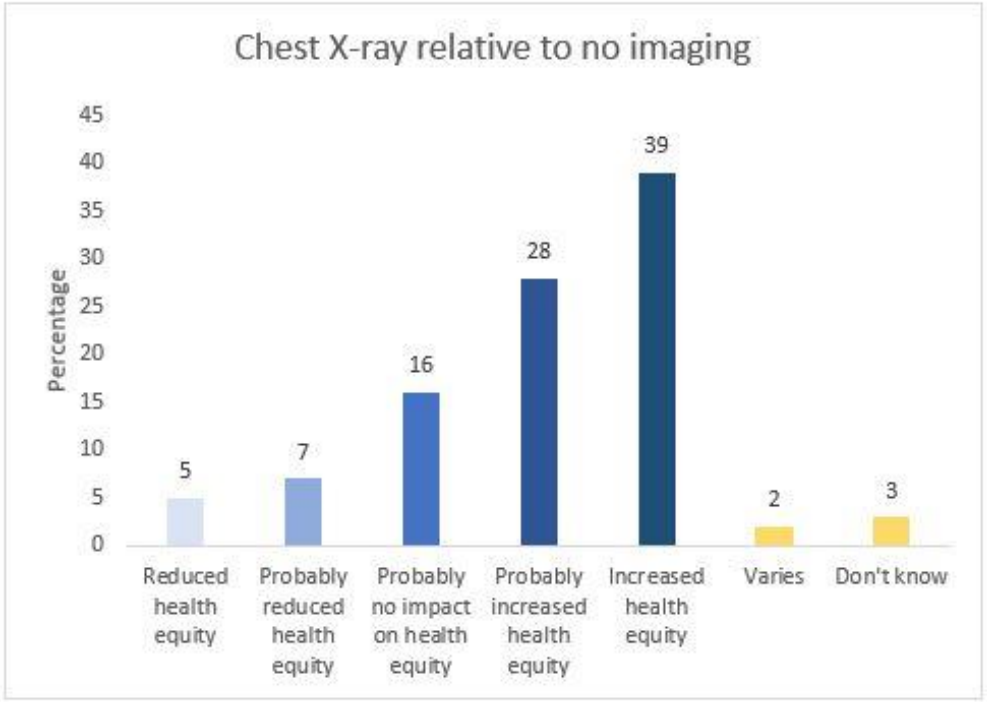
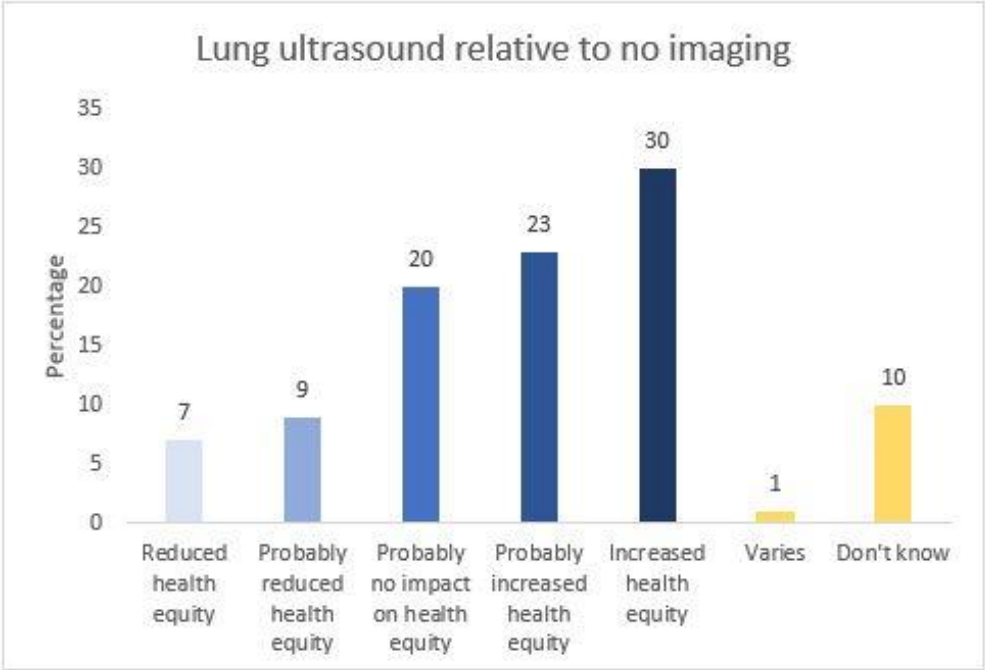
- physicians (14%)
- technicians (61%)
- other health professionals (4%)
- researchers (5%)
- policy-makers (3%)
- other (8%)

Equity

What would be the impact on health equity?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Reduced ○ Probably reduced ● Probably no impact ○ Probably increased ○ Increased ○ Varies ○ Don't know		The voting results are: • Reduced: 0 • Probably reduced: 4 • Probably no impact : 4 • Probably increased: 2 • Increased: 1 • Varies: 0 • Don't know : 0


Chest X-ray relative to no imaging
Percentage
45
40
35
30
25
20
15
10
5
0
5
7
16
28
39
2
3
Reduced health equity
Probably reduced health equity
Probably no impact on health equity
Probably increased health equity
Increased health equity
Varies
Don't know



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•physicians (14%)

•technicians (61%)

•other health professionals (4%)

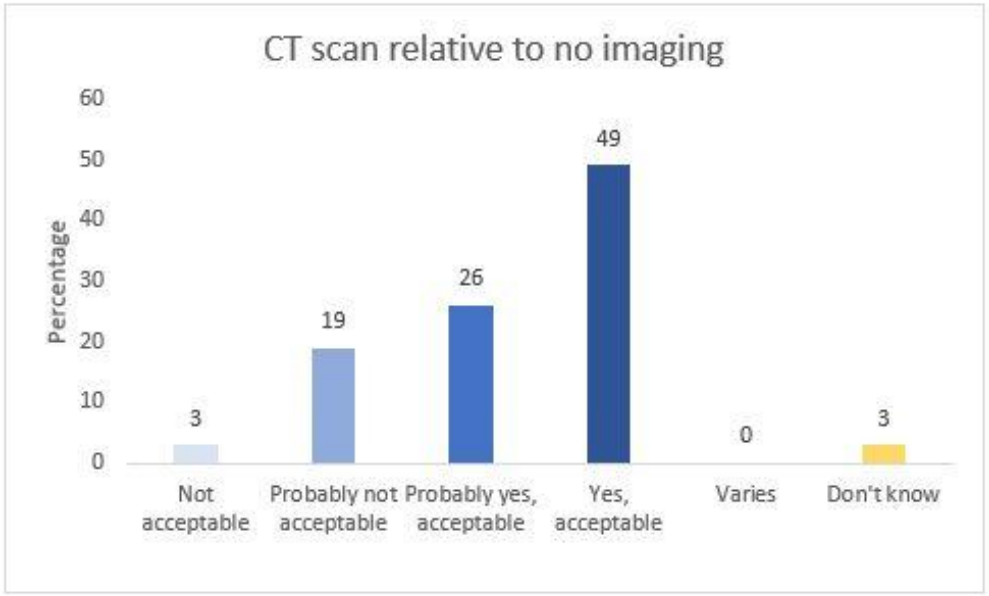
•researchers (5%)

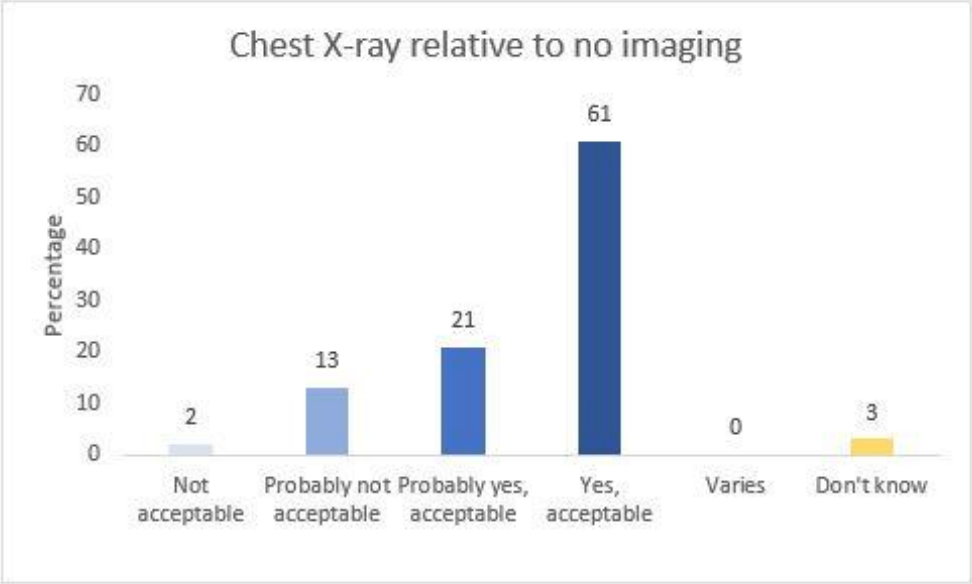
•policy-makers (3%)

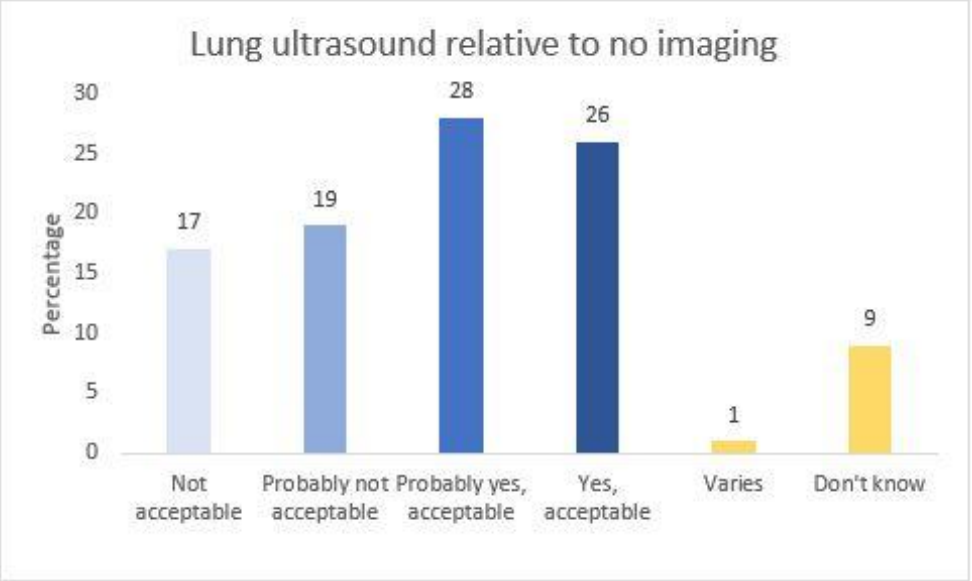
•other (8%)

Acceptability

Is the intervention acceptable to key stakeholders?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know		The voting results are: • No : 0 • Probably no : 0 • Probably yes: 7 • Yes: 4 • Varies: 0 • Don't know : 0

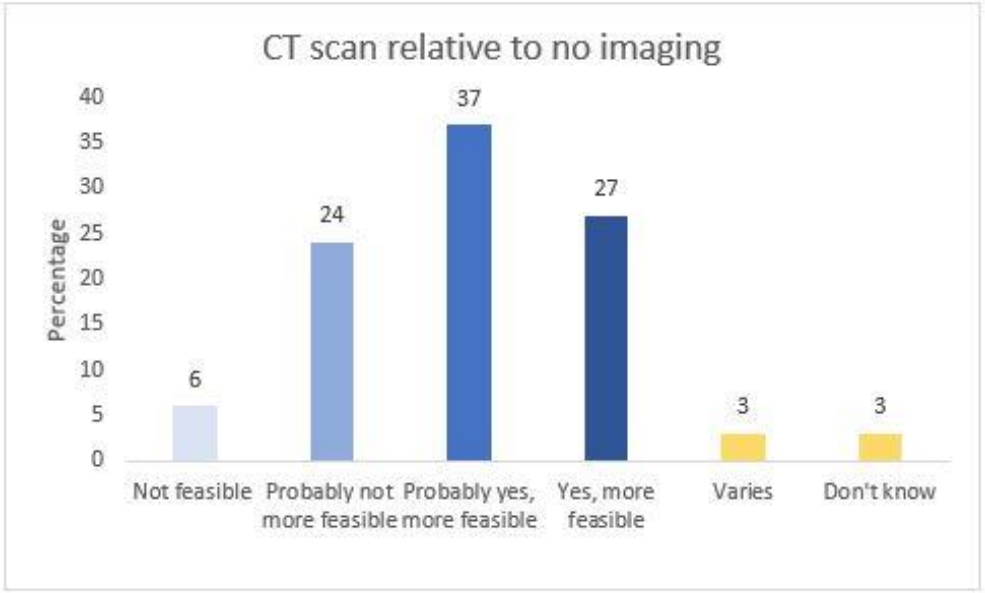

Chest X-ray relative to no imaging
Percentage
70
60
50
40
30
20
10
0
2
13
21
61
0
3
Not acceptable
Probably not acceptable
Probably yes, acceptable
Yes, acceptable
Varies
Don't know

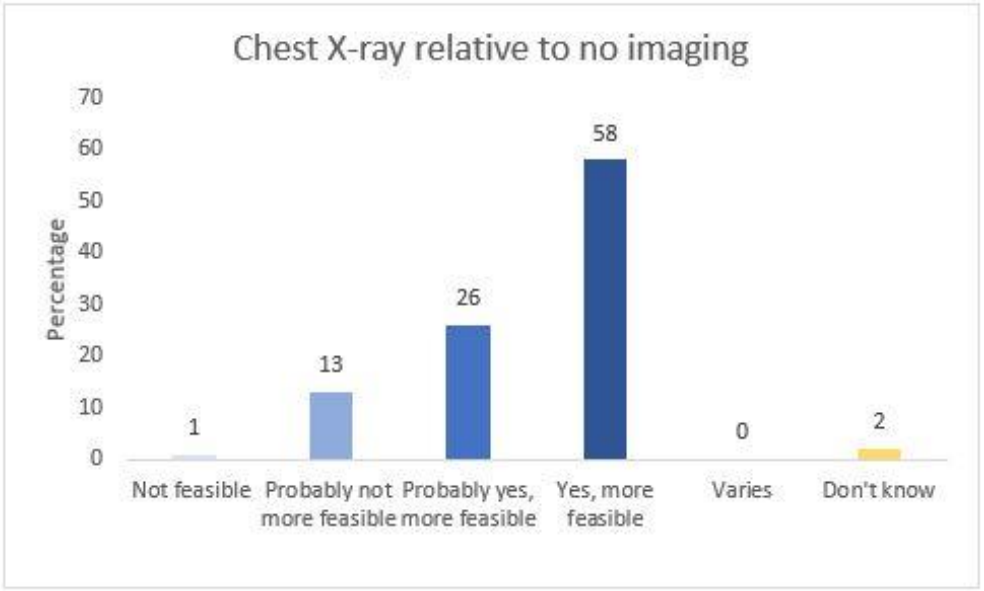

Lung ultrasound relative to no imaging
Percentage
30
25
20
15
10
5
0
17
19
28
26
1
9
Not acceptable
Probably not acceptable
Probably yes, acceptable
Yes, acceptable
Varies
Don't know

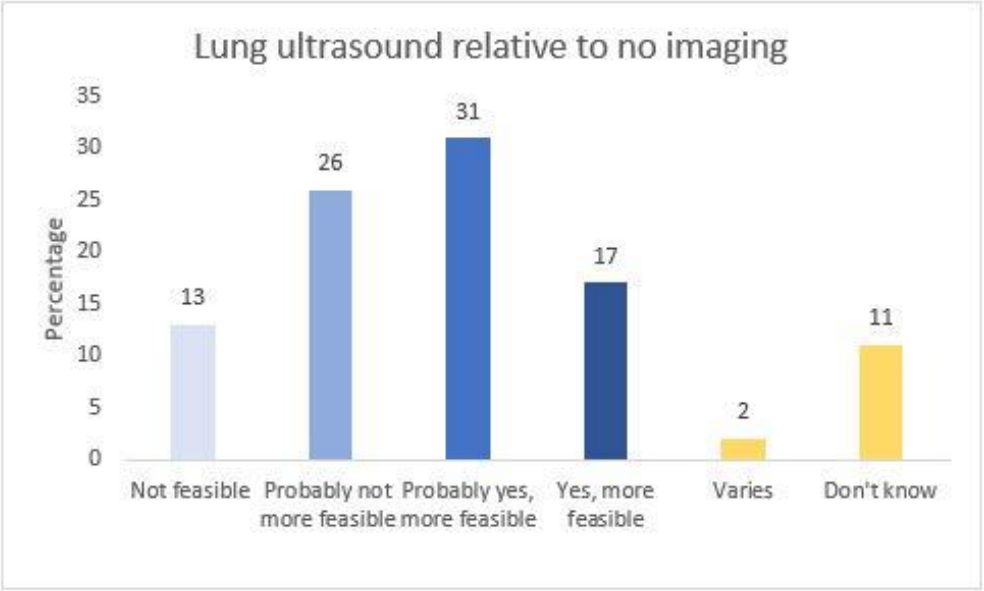
	Respondents (n=93) included: •members of the public (2%) •patients (3%) •physicians (14%) •technicians (61%) •other health professionals (4%) •researchers (5%) •policy-makers (3%) •other (8%)	

Feasibility

Is the intervention feasible to implement?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know		The voting results are: • No : 0 • Probably no : 0 • Probably yes: 8 • Yes: 2 • Varies: 0 • Don't know : 0





Respondents (n=93) included:

•members of the public (2%)

	•patients (3%) •physicians (14%) •technicians (61%) •other health professionals (4%) •researchers (5%) •policy-makers (3%) •other (8%)	

SUMMARY OF JUDGEMENTS

	JUDGEMENT						
DESIRABLE EFFECTS	Trivial	Small	**Moderate**	Large		Varies	Don't know
UNDESIRABLE EFFECTS	Large	Moderate	**Small**	Trivial		Varies	Don't know
CERTAINTY OF EVIDENCE	**Very low**	Low	Moderate	High			No included studies
VALUES	Important uncertainty or variability	**Possibly important uncertainty or variability**	Probably no important uncertainty or variability	No important uncertainty or variability			
BALANCE OF EFFECTS	Favors the comparison	Probably favors the comparison	Does not favor either the intervention or the comparison	**Probably favors the intervention**	Favors the intervention	Varies	Don't know
RESOURCES REQUIRED	Large costs	**Moderate costs**	Negligible costs and savings	Moderate savings	Large savings	Varies	Don't know
EQUITY	Reduced	Probably reduced	**Probably no impact**	Probably increased	Increased	Varies	Don't know
ACCEPTABILITY	No	Probably no	**Probably yes**	Yes		Varies	Don't know
FEASIBILITY	No	Probably no	**Probably yes**	Yes		Varies	Don't know

TYPE OF RECOMMENDATION

Strong recommendation against the intervention	Conditional recommendation against the intervention	Conditional recommendation for either the intervention or the comparison	**Conditional recommendation for the intervention**	Strong recommendation for the intervention
○	○	○	●	○

CONCLUSIONS

Recommendation

For patients with suspected or confirmed COVID-19, currently hospitalized and with moderate to severe symptoms, WHO **suggests using** chest imaging to inform the therapeutic management (conditional recommendation, based on very low certainty evidence)

Remarks:

Patients likely to benefits are those who:

- are at high risk of disease progression
- are not responding to treatment

When choosing an imaging modality, consider the following

- Chest x-ray is associated with lower risk of HCW infection transmission; is less resource intensive (adequate for low resource settings); is associated with radiation doses lower than for CT scans, and would help in monitoring disease progression, which may require multiple/sequential imaging procedures
- CT scan is preferred in patients with pre-existing pulmonary disease;
- LUS is helpful with the appropriate expertise and can be done at the point of care. However, it requires closer physical proximity of the operator to the patient for a longer period of time and would require specific infection prevention and control precautions.
- Choice should consider the differential diagnosis in the specific case (e.g., CT angiography for pulmonary embolism, LUS for pleural effusions)
- Choice should be through a shared decision making involving the patient, the referrer physician and the radiologist;

The voting results are:

- Strong recommendation against the intervention: 0
- Conditional recommendation against the intervention: 0
- Conditional recommendation for either the intervention or the comparison: 0
- Conditional recommendation for the intervention: 9
- Strong recommendation for the intervention: 0

Justification

Subgroup considerations

Implementation considerations

Monitoring and evaluation

Research priorities

QUESTION (PICO 7)

Should chest imaging be added to standard of care vs. not added be used for patients with COVID-19 whose symptoms resolved; context of a decision to choose between discharge home vs. no discharge home?	
POPULATION:	Patients with COVID-19 whose symptoms resolved
INTERVENTION:	Chest imaging added to standard of care
COMPARISON:	Chest imaging not added to standard of care
MAIN OUTCOMES:	1. Clinical outcomes • Mortality • Respiratory failure

	• Multiorgan failure
	• Shortness of breath
	• Recovery
	• Adverse effects of imaging (e.g., exposure to radiation)
	• COVID-19 transmission to health workers
	
	2. Health systems outcomes
	
	• Service use, including:
	  ○ Length of stay in Emergency Department
	  ○ Length of hospital stay
	  ○ Length of ICU stay
	• Availability of care
	• Access to care
	• Quality of care

SETTING:	Decision to choose between discharge home vs. no discharge home
PERSPECTIVE:	Societal perspective
BACKGROUND:	
CONFLICT OF INTERESTS:	

ASSESSMENT

Desirable Effects

How substantial are the desirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Trivial ● Small ○ Moderate ○ Large ○ Varies ○ Don't know	• **No study evaluated the effects of chest imaging on clinical outcomes** • **No study evaluated the effects of chest imaging on health systems outcomes**	• Any benefit is reduced by the fact that the radiologic improvement lags behind the clinical improvement • Potential benefit is to assess for post COVID-19 sequelae • Might be used to assess the progression or regression of the radiologic findings • Lack of data for the association between radiological findings and rate of readmission

		The voting results are: • Trivial: 4 • Small: 7 • Moderate: 4 • Large: 1 • Varies: 0 • Don't know : 0

Undesirable Effects

How substantial are the undesirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Large ○ Moderate ● Small ○ Trivial ○ Varies ○ Don't know	• **No study evaluated the effects of chest imaging on clinical outcomes** • **No study evaluated the effects of chest imaging on health systems outcomes**	• Identification of incidental findings • HCWs exposure • Harm of radiation The voting results are: • Large: 2 • Moderate: 6 • Small: 7 • Trivial: 1 • Varies: 0 • Don't know : 0

Certainty of evidence

What is the overall certainty of the evidence of effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
● Very low ○ Low ○ Moderate ○ High ○ No included studies		• Very low for CT vs. no CT • Very low for CXR vs. no CXR • Very low for US vs. no US

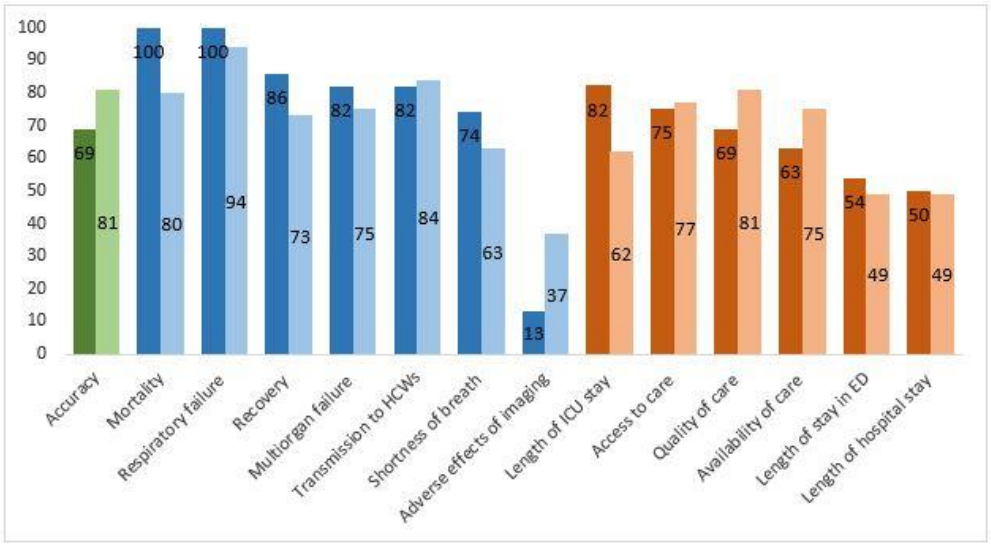
Values

Is there important uncertainty about or variability in how much people value the main outcomes?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Important uncertainty or variability ● Possibly important uncertainty or variability ○ Probably no important uncertainty or variability ○ No important uncertainty or variability	**Outcomes valuation (stakeholders n=249):**	The voting results are: • Important uncertainty or variability: 2 • Possibly important uncertainty or variability: 7 • Probably no important uncertainty or variability: 4 • No important uncertainty or variability: 1

Outcomes	Not important (%)		Important (%)		Critical (%)	
	GDG	Stakeholders	GDG	Stakeholders	GDG	Stakeholders
Accuracy	0	1	32	19	69	81
Mortality	0	6	0	16	100	80
Respiratory failure	0	4	0	4	100	94
Multiorgan failure	0	5	19	22	82	75
Shortness of breath	0	6	27	33	74	63
Recovery	0	4	15	25	86	73
Adverse effects of imaging	44	24	44	40	13	37
Transmission to HCWs	7	3	13	14	82	84
Length of stay in ED	14	12	34	40	54	49
Length of hospital stay	13	8	38	44	50	49
Length of ICU stay	0	4	19	36	82	62
Availability of care	0	4	38	23	63	75
Access to care	0	4	25	21	75	77
Quality of care	7	3	25	18	69	81

Critical outcomes (GDG, stakeholders n=249):



Green: accuracy of the diagnostic modality; blue: clinical outcomes; orange: health systems outcomes

Dark color: GDG; light color: stakeholders

Stakeholder respondents (n=249) included:

	•members of the public (3%) •patients (2%) •physicians (22%) •technicians (53%) •other health professionals (5%) •researchers (3%) •policy-makers (3%) •other (7%)	

Balance of effects

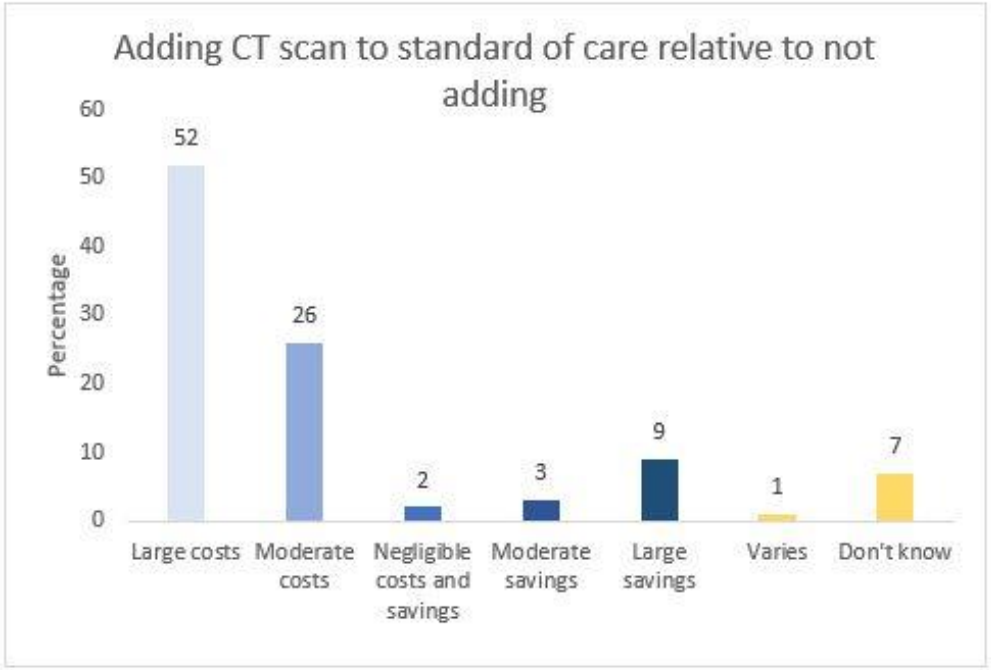
Does the balance between desirable and undesirable effects favor the intervention or the comparison?

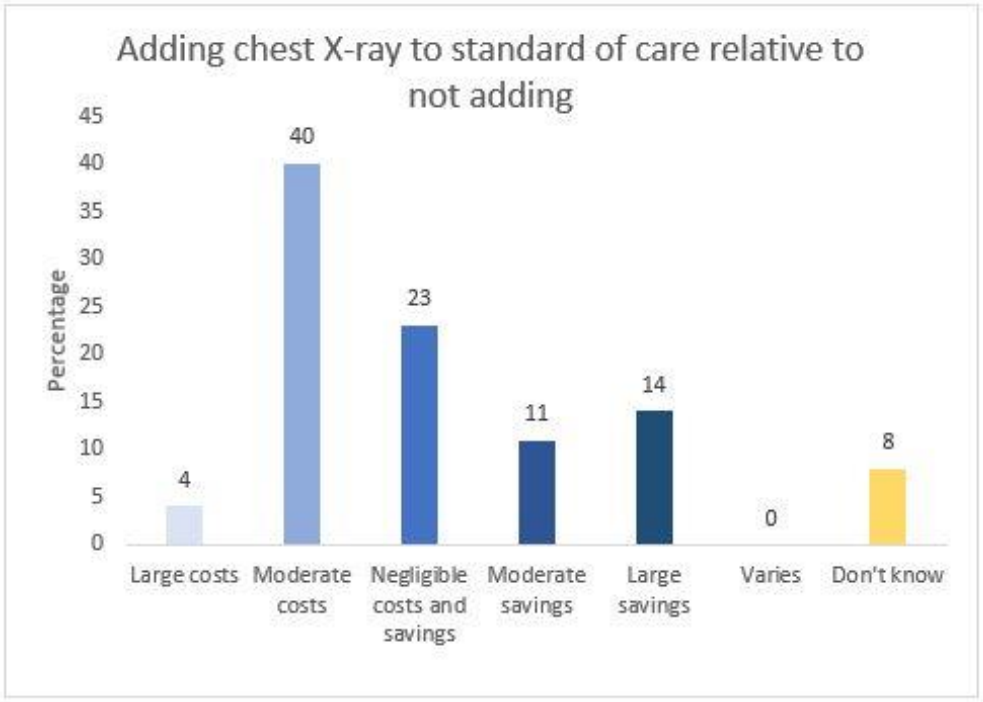
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Favors the comparison ● Probably favors the comparison ○ Does not favor either the intervention or the comparison ○ Probably favors the intervention ○ Favors the intervention ○ Varies ○ Don't know		The voting results are: • Favors the comparison: 4 • Probably favors the comparison: 8 • Does not favor either the intervention or the comparison: 0 • Probably favors the intervention: 2 • Favors the intervention : 1 • Varies: 0 • Don't know : 0

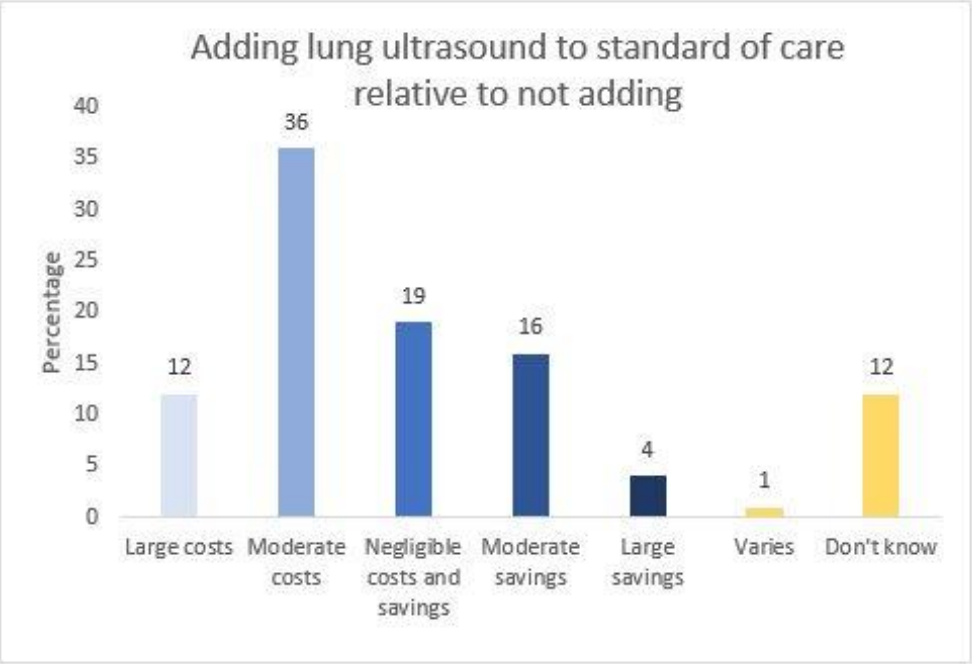
Resources required

How large are the resource requirements (costs)?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Large costs ● Moderate costs ○ Negligible costs and savings ○ Moderate savings ○ Large savings ○ Varies ○ Don't know		The voting results are: • Large costs: 2 • Moderate costs: 10 • Negligible costs and savings: 0 • Moderate savings: 0 • Large savings: 0 • Varies: 1 • Don't know : 0


Adding CT scan to standard of care relative to not adding
Percentage
60
50
40
30
20
10
0
52
26
2
3
9
1
7
Large costs
Moderate costs
Negligible costs and savings
Moderate savings
Large savings
Varies
Don't know


Adding chest X-ray to standard of care relative to not adding
Percentage
45
40
35
30
25
20
15
10
5
0
4
40
23
11
14
0
8
Large costs
Moderate costs
Negligible costs and savings
Moderate savings
Large savings
Varies
Don't know



Respondents (n=90) included:

•members of the public (2%)

•patients (3%)

•physicians (18%)

•technicians (56%)

•other health professionals (4%)

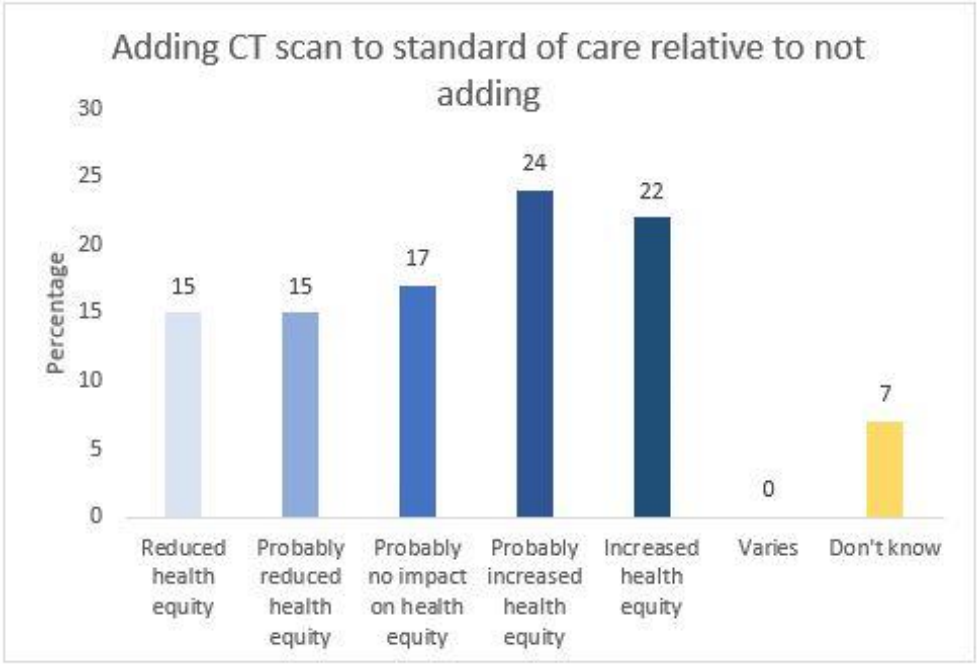
•researchers (6%)

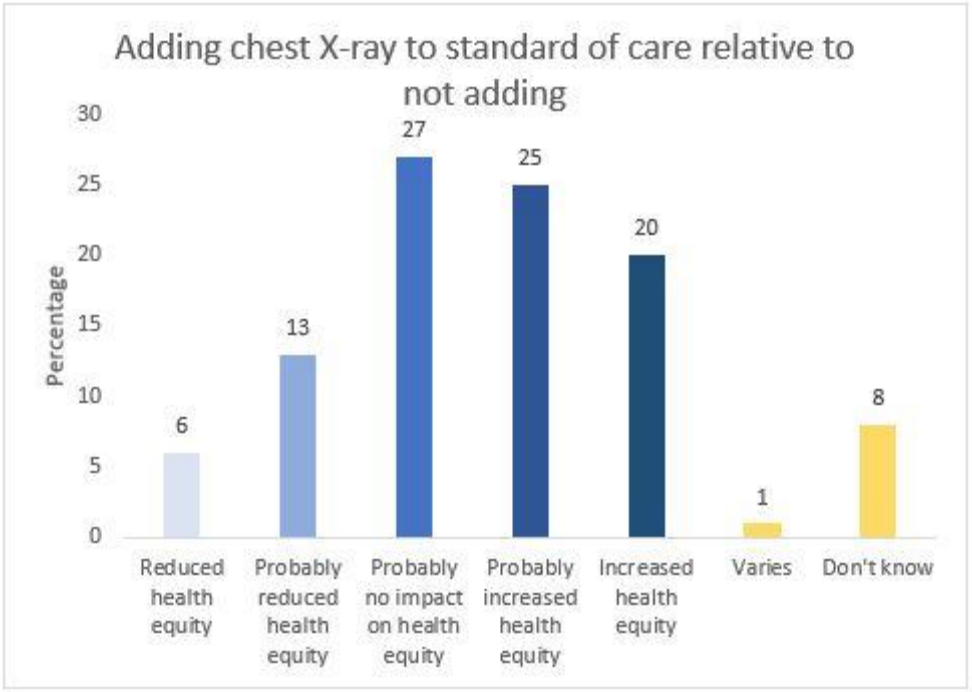
•policy-makers (3%)

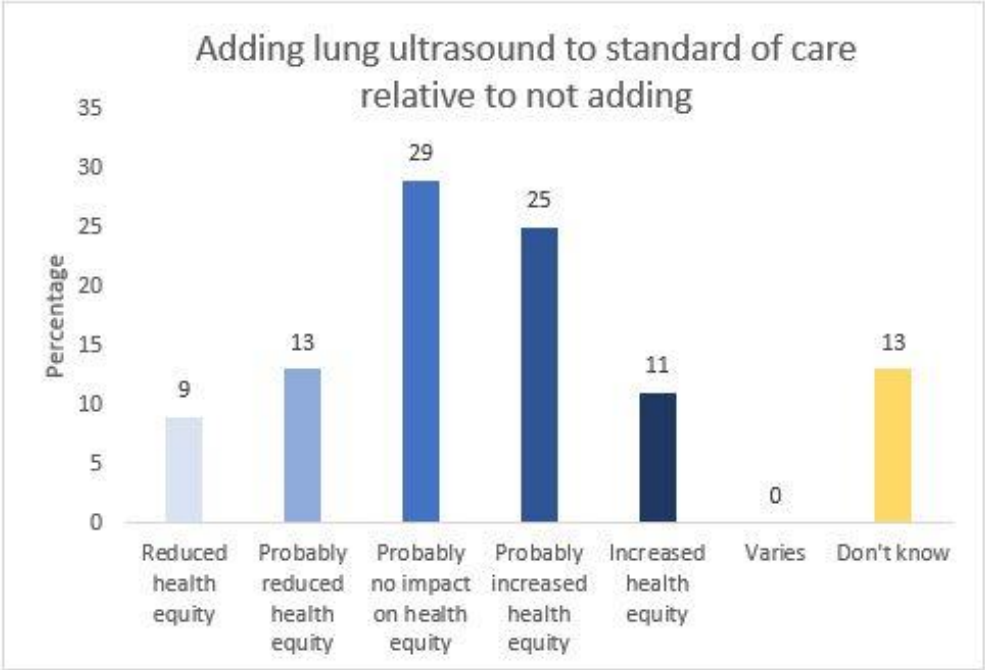
•other (8%)

Equity

What would be the impact on health equity?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Reduced ● Probably reduced ○ Probably no impact ○ Probably increased ○ Increased ○ Varies ○ Don't know		The voting results are: • Reduced: 0 • Probably reduced: 9 • Probably no impact : 2 • Probably increased: 2 • Increased: 0 • Varies: 1 • Don't know : 0


Adding chest X-ray to standard of care relative to not adding
Percentage
30
25
20
15
10
5
0
6
13
27
25
20
1
8
Reduced health equity
Probably reduced health equity
Probably no impact on health equity
Probably increased health equity
Increased health equity
Varies
Don't know



Respondents (n=90) included:

•members of the public (2%)

•patients (3%)

•physicians (18%)

•technicians (56%)

•other health professionals (4%)

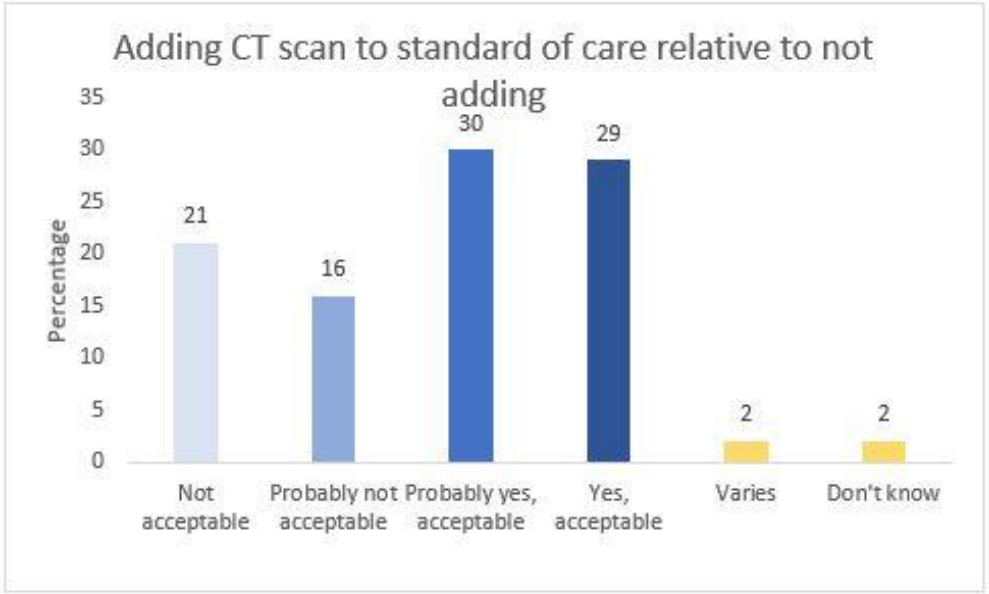
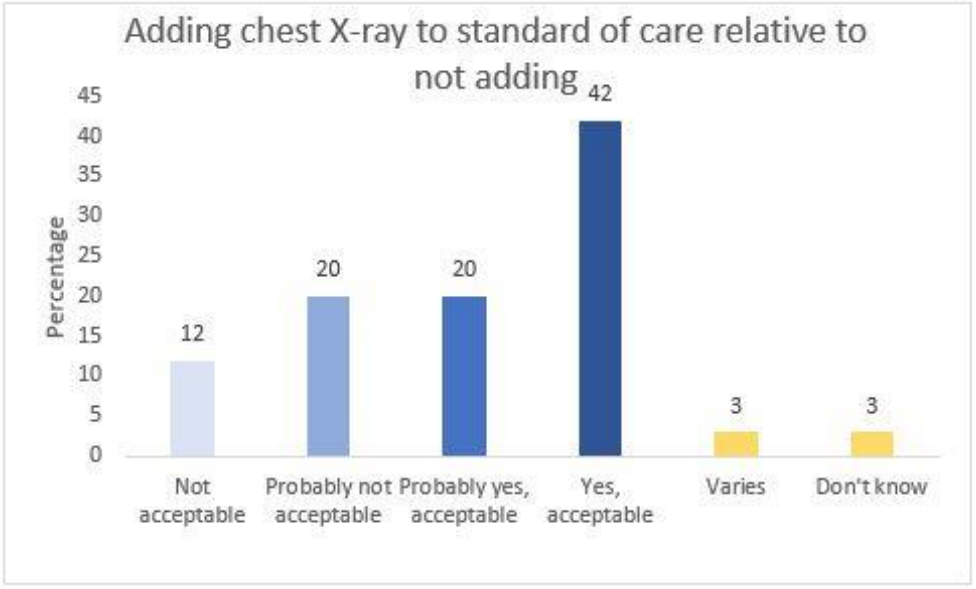
•researchers (6%)

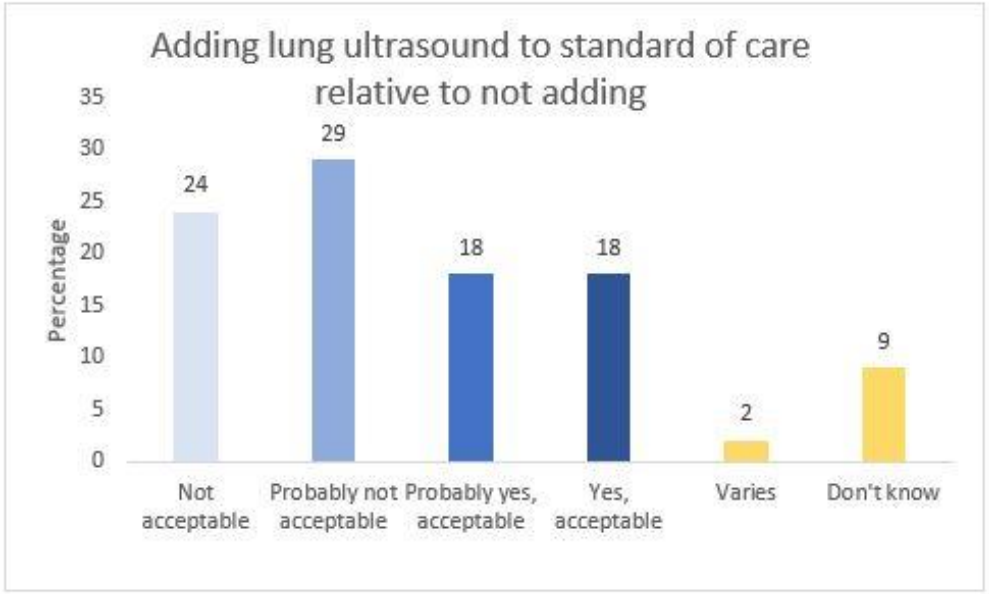
•policy-makers (3%)

•other (8%)

Acceptability

Is the intervention acceptable to key stakeholders?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know	 	The voting results are: • No: 0 • Probably no : 6 • Probably yes: 7 • Yes: 1 • Varies: 0 • Don't know : 0



Respondents (n=90) included:

•members of the public (2%)

•patients (3%)

•physicians (18%)

•technicians (56%)

•other health professionals (4%)

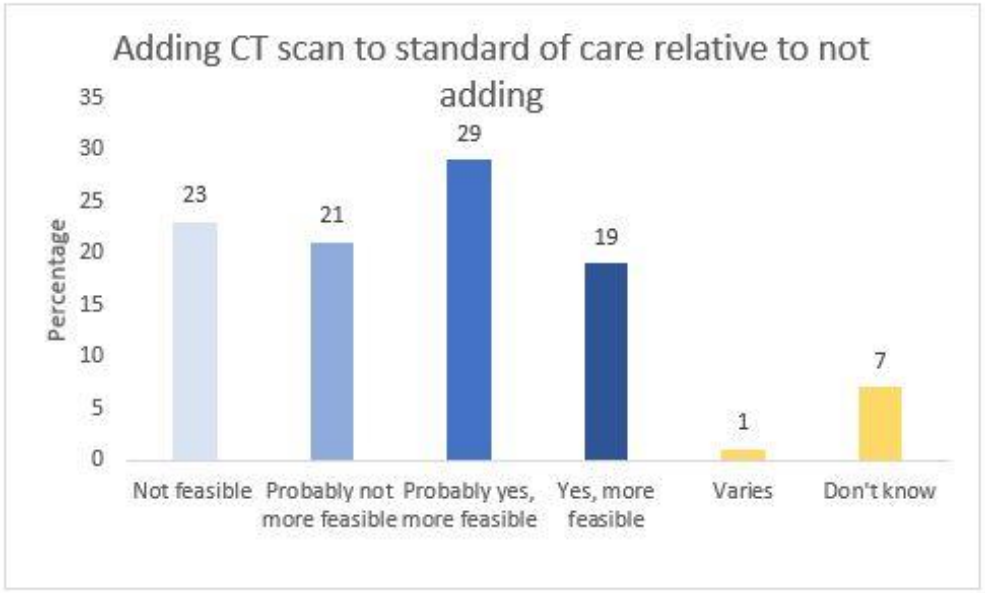
•researchers (6%)

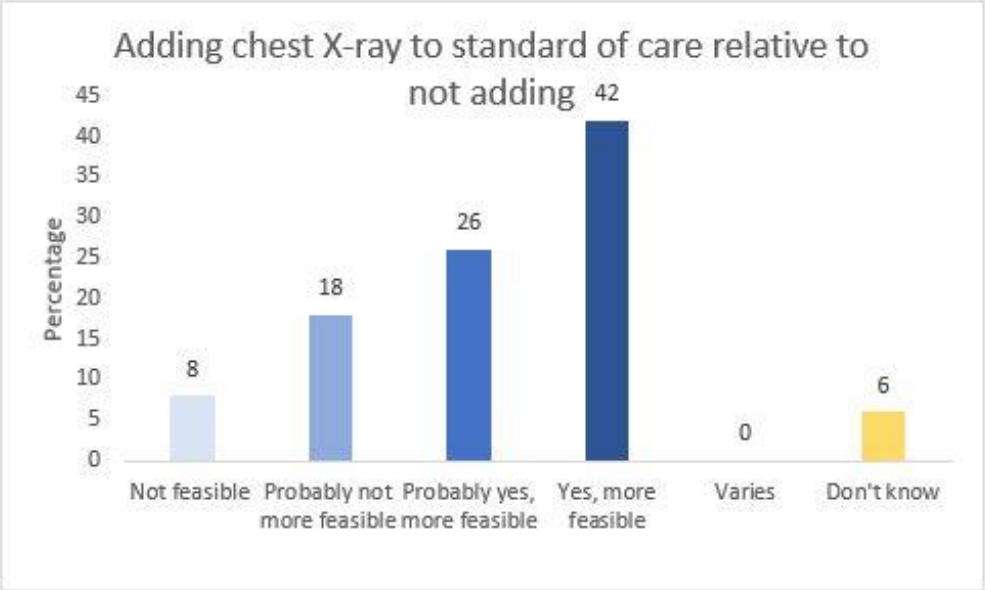
•policy-makers (3%)

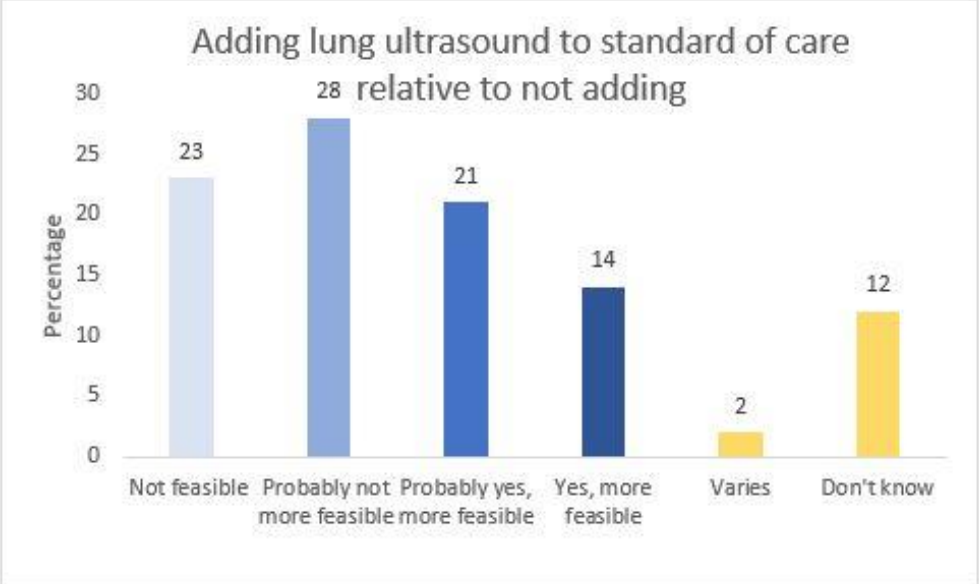
•other (8%)

Feasibility

Is the intervention feasible to implement?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know		The voting results are: • No : 0 • Probably no : 4 • Probably yes: 8 • Yes: 3 • Varies: 0 • Don't know : 0





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•members of the public (2%)

	•patients (3%) •physicians (18%) •technicians (56%) •other health professionals (4%) •researchers (6%) •policy-makers (3%) •other (8%)	

SUMMARY OF JUDGEMENTS

	JUDGEMENT						
DESIRABLE EFFECTS	Trivial	**Small**	Moderate	Large		Varies	Don't know
UNDESIRABLE EFFECTS	Large	Moderate	**Small**	Trivial		Varies	Don't know
CERTAINTY OF EVIDENCE	**Very low**	Low	Moderate	High			No included studies
VALUES	Important uncertainty or variability	**Possibly important uncertainty or variability**	Probably no important uncertainty or variability	No important uncertainty or variability			
BALANCE OF EFFECTS	Favors the comparison	**Probably favors the comparison**	Does not favor either the intervention or the comparison	Probably favors the intervention	Favors the intervention	Varies	Don't know
RESOURCES REQUIRED	Large costs	**Moderate costs**	Negligible costs and savings	Moderate savings	Large savings	Varies	Don't know
EQUITY	Reduced	**Probably reduced**	Probably no impact	Probably increased	Increased	Varies	Don't know
ACCEPTABILITY	No	Probably no	**Probably yes**	Yes		Varies	Don't know
FEASIBILITY	No	Probably no	**Probably yes**	Yes		Varies	Don't know

TYPE OF RECOMMENDATION

Strong recommendation against the intervention	**Conditional recommendation against the intervention**	Conditional recommendation for either the intervention or the comparison	Conditional recommendation for the intervention	Strong recommendation for the intervention
○	●	○	○	○

CONCLUSIONS

Recommendation

For hospitalized patients with COVID-19 whose symptoms resolved, WHO **suggests not adding** chest imaging to clinical and/or laboratory assessment to inform the decision regarding discharge (conditional recommendation, based on very low certainty evidence)

Remarks:

- Standard of care varies based on context (and the community)
- Different criteria for discharge based on resources and stage of the outbreak

The voting results are:

- Strong recommendation against the intervention: 0
- Conditional recommendation against the intervention: 9
- Conditional recommendation for either the intervention or the comparison: 1
- Conditional recommendation for the intervention: 4
- Strong recommendation for the intervention: 0

Justification

Subgroup considerations

Implementation considerations

Monitoring and evaluation

Research priorities