

QUESTION

Should in-situ simulation vs. another non-in-situ simulation modality be used for training interprofessional healthcare providers to improve perceptions, knowledge, skills, clinician behaviors, and patient care outcomes?

POPULATION:	training interprofessional healthcare providers to improve perceptions, knowledge, skills, clinician behaviors, and patient care outcomes
INTERVENTION:	in-situ simulation
COMPARISON:	another non-in-situ simulation modality
MAIN OUTCOMES:	Safety event Mitigation; Participant Reactions and Preferences; Knowledge Improvement; Technical Skills as Applied to Clinical Care; Need For Remediation; Resource Impact; Cost Impact; Adverse Emotional Impact; Adverse Care Impact;
SETTING:	
PERSPECTIVE:	
BACKGROUND:	
CONFLICT OF INTERESTS:	

ASSESSMENT

Problem

Is the problem a priority?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<div><div><div><div><div><div></div></div><div>No</div></div><div><div><div></div></div><div>Probably no</div></div><div><div><div></div></div><div>Probably yes</div></div><div><div><div></div></div><div>Yes</div></div><div><div><div></div></div><div>Varies</div></div><div><div><div></div></div><div>Don't know</div></div></div></div></div>		<div>This judgement is based solely on the fact that we deemed the question important enough to look at.</div>

Desirable Effects

How substantial are the desirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS						
<div><div><div><div><div><div></div></div><div>Trivial</div></div><div><div><div></div></div><div>Small</div></div><div><div><div></div></div><div>Moderate</div></div><div><div><div></div></div><div>Large</div></div><div><div><div></div></div><div>Varies</div></div><div><div><div></div></div><div>Don't know</div></div></div></div></div>	<table><tr><td>Outcomes</td><td>Impact</td></tr><tr><td>Safety event Mitigation</td><td>97 cliniciansIn-situ simulationidentified 21% more organizational issues (qualitative, no statistical comp).</td></tr><tr><td>Participant Reactions and Preferences</td><td>Note: Also quasi-experimental studies1667 clinicians Summary:Percent change ranged from 35% against in-situ to 10% in favor.Pvalues</td></tr></table>	Outcomes	Impact	Safety event Mitigation	97 cliniciansIn-situ simulationidentified 21% more organizational issues (qualitative, no statistical comp).	Participant Reactions and Preferences	Note: Also quasi-experimental studies1667 clinicians Summary:Percent change ranged from 35% against in-situ to 10% in favor.Pvalues	<div>Discussed as we analyzed the data</div>
Outcomes	Impact							
Safety event Mitigation	97 cliniciansIn-situ simulationidentified 21% more organizational issues (qualitative, no statistical comp).							
Participant Reactions and Preferences	Note: Also quasi-experimental studies1667 clinicians Summary:Percent change ranged from 35% against in-situ to 10% in favor.Pvalues							

		<p>ranged from 0.79 to &lt; 0.001 Detail:Confidence qualitatively improved Pre/post, but no statistical comparisons were made between groupsSimulation experience scores differed in favor of the non-in situ group (41.5, vs 31.78, <math>p &lt; 0.001</math>). but this study had an unorthodox design comparing non-in situ sim plus didactic to in-situ with no didactic.Authenticity of in-situ rated higher for cesarean section(4 (3–4) to 3 (3–4)) (<math>p = 0.02</math>), authenticity of postpartum hemorrhage better for in-situ (4 (3–4) vs 3 (3–4) <math>p = 0.01</math>).No significant difference in perceived comfort between in-situ and center-based sim on multiple items</p>	
	Knowledge Improvement	<p>97 Clinicians MCQ scores showed no significant difference</p>	
	Technical Skills as Applied to Clinical Care	<p>57 clinicians Summary: 22.9–33% improvement P value range 0.049–0.012 Detail: 30% (2/6) metrics of intubation skill improved, with these focused on hands/on measures of performance. Percent scored as “excellent” in laryngoscope technique 27% vs 60%, <math>p = 0.026</math> Percent scored as “excellent” in intubation technique 13.8 vs 42% , <math>P = 0.012</math> 41.4 vs 64.3 <math>p = 0.049</math> were scored excellent in overall “competence” in favor of intervention. All numbers in favor of in-situ</p>	
	Need For Remediation	<p>57 Clinicians Less need for remediation in in-situ 40% vs 14.3% <math>p = 0.04</math></p>	

## Undesirable Effects

How substantial are the undesirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
-----------	-------------------	---------------------------

<ul style="list-style-type: none"> <li>○ Large</li> <li>○ Moderate</li> <li>○ Small</li> <li>● Trivial</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<p>No untoward effects discussed in papers. One paper showed some lower perceptions of in-situ simulation, but this paper was severely confounded, calling this into question. For this reason only I denoted this as trivial, rather than unexamined</p>	<p>Potential undesirable effects that should be examined in future studies are Resource Impact, Cost Impact, Adverse Emotional Impact, Adverse Care Impact</p>
---	---	--

## Certainty of evidence

What is the overall certainty of the evidence of effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <li>○ Very low</li> <li>○ Low</li> <li>● Moderate</li> <li>○ High</li> <li>○ No included studies</li> </ul>	<p>Several RCT's were found although the majority were observational</p>	<p>See Evidence Table</p>

## Values

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

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>○ Probably no important uncertainty or variability</li> <li>● No important uncertainty or variability</li> </ul>	<p>After discussing all main outcomes, the group agreed readily on the importance of each, with several being critical, several important, and two unimportant.</p>	

## Balance of effects

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

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <li>○ Favors the comparison</li> <li>○ Probably favors the comparison</li> <li>○ Does not favor either the intervention or the comparison</li> <li>● Probably favors the intervention</li> <li>○ Favors the intervention</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<p>Significant positive evidence in tables for in-situ as applied to latent safety threat detection and enhanced performance of technical skills in the patient care environment. One paper showed some lower perceptions of in-situ simulation, but this paper was severely confounded, calling this into question.</p>	<p>Cannot rank as clearly in favor without data as to potential undesirable effects, cost, and feasibility.</p>

## Resources required

How large are the resource requirements (costs)?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
-----------	-------------------	---------------------------

<ul style="list-style-type: none"> <li>○ Large costs</li> <li>○ Moderate costs</li> <li>○ Negligible costs and savings</li> <li>○ Moderate savings</li> <li>○ Large savings</li> <li>○ Varies</li> <li>● Don't know</li> </ul>		These were not clearly described in these studies, nor compared when possible to control groups.
--	--	--

## Certainty of evidence of required resources

What is the certainty of the evidence of resource requirements (costs)?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <li>○ Very low</li> <li>○ Low</li> <li>○ Moderate</li> <li>○ High</li> <li>● No included studies</li> </ul>		These were not clearly described in these studies, nor compared when possible to control groups.

## Cost effectiveness

Does the cost-effectiveness of the intervention favor the intervention or the comparison?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <li>○ Favors the comparison</li> <li>○ Probably favors the comparison</li> <li>○ Does not favor either the intervention or the comparison</li> <li>○ Probably favors the intervention</li> <li>○ Favors the intervention</li> <li>○ Varies</li> <li>● No included studies</li> </ul>	No studies specifically addressed the cost of the intervention.	

## Equity

What would be the impact on health equity?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <li>○ Reduced</li> <li>○ Probably reduced</li> <li>○ Probably no impact</li> <li>● Probably increased</li> <li>○ Increased</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	The overall positive direction in change for key metrics would support a probable improvement in equity given that low-cost in-situ mannequins exist that can be deployed in low-income settings.	

## Acceptability

Is the intervention acceptable to key stakeholders?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>● Probably yes</li> <li>○ Yes</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	Most studies addressing this issue showed a positive to neutral acceptance of in-situ by learners. One paper showed some lower perceptions of in-situ simulation, but this paper was severely confounded, calling this into question.	This was largely based on panel experience, as most of us could foresee administrators supporting interventions such as this one.

## Feasibility

Is the intervention feasible to implement?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <li>○ No</li> <li>○ Probably no</li> <li>○ Probably yes</li> <li>○ Yes</li> <li>● Varies</li> <li>○ Don't know</li> </ul>		This would vary depending on the staffing and resources available in various institutions and region.

## SUMMARY OF JUDGEMENTS

	JUDGEMENT						
PROBLEM	No	Probably no	Probably yes	Yes		Varies	Don't know
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
CERTAINTY OF EVIDENCE OF REQUIRED RESOURCES	Very low	Low	Moderate	High			No included studies
COST EFFECTIVENESS	Favors the comparison	Probably favors the comparison	Does not favor either the intervention or the comparison	Probably favors the intervention	Favors the intervention	Varies	No included studies
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 interprofessional healthcare providers we suggest the use of in-situ simulation as opposed to non-in-situ simulation modalities when attempting to uncover or mitigate latent safety threats, when attempting to positively impact technical skill performance within the patient care environment, or when environmental authenticity and fidelity are of special importance.

Justification

One randomized controlled trial demonstrated positive effects of in-situ simulation, as compared with non-in-situ simulation, on ability to successfully perform endotracheal intubation. The same study showed a reduction in required remediation in the in-situ group. Another randomized controlled trial showed enhanced detection of latent safety threats when in-situ simulation is employed. with equivalent knowledge scores between groups. Several quasi-experimental studies showed no improvement to positive improvement in participant reactions. Although one study showed worse perceptions of in-situ simulation when compared with video-based simulation, this study was significantly confounded.

Subgroup considerations

While participant perceptions of in-situ were neutral to slightly positive among studies examining these outcomes, one study noted enhanced perception of authenticity and fidelity in in-situ simulation. This suggests in-situ simulation may be profitably employed in situations where environmental fidelity is deemed to be of special importance.

Implementation considerations

As cost and resource use was not measured in the dataset, it will be vital for institutions implementing this guideline to carefully consider these in order to assure an approach that is sustainable over time. Potential negative impact of in-situ sim on patient workflow in adjacent care areas, as well as its impact on the emotional wellbeing of providers, should also be measured over time.

Monitoring and evaluation

NA

Research priorities

Specific research priorities included the following

1. A need for high-quality studies focused on the impact of in-situ simulation on hospital and program resource use, and how this relates to its cost-effectiveness as an intervention.
2. A need for high-quality studies focused on the financial costs of in-situ simulation on hospital and how this relates to its cost-effectiveness as an intervention. Comparison could be made between costs of the program vs potential cost savings due to avoided harm events.
3. A need to measure the effect of in-situ simulation (especially "surprise" in-situ simulation) on the emotions of providers who are called to participate in these

sessions.

4. A need to measure the effect of in-situ simulation (especially "surprise" in-situ simulation) on the care given to other patients on the ward or floor adjacent to the simulation.
5. A need to better quantify the effect of in-situ simulation on perceptions of fidelity in a manner that could permit its targeted application.

## REFERENCES SUMMARY