QUESTION

Should Spaced vs. Massed for skill acquisition be used for Simulation skills acquisition?	
POPULATION:	Simulation skills acquisition
INTERVENTION:	Spaced training
COMPARISON:	Massed training
MAIN OUTCOMES:	Total time - Retention; Total Time - Immediate; Final product score - Immediate; Task competency GRS - retention; Task competency GRS - immediate; Procedure specific measures - retention; Process specific measures - immediate;

ASSESSMENT

Problem

Is the problem a priority?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ○ Probably yes ● Yes ○ Varies ○ Don't know	Understanding the potential impact of spaced training is important because there is a signal that spaced-training may be superior to massed training in some constexts and settings, but it is often more time and resource intensive than massed training.	

Desirable Effects

How substantial are the desirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Trivial ○ Small ● Moderate ○ Large ○ Varies ○ Don't know	While there was signifincant heterogeneity between outcomes, there are moderate potential desriable effects from spaced training to improve the aquisiton of competence. The findings for each outcome measures were: **TIME at RETENTION favored spaced (moderate)** **(TIME IMMEDIATE favored spaced)** **FINAL PRODUCT IMMEDIATE favored spaced (trivial to large)** **GRS at RETENTION favored spaced (moderate)** (GRS IMMEDIATE inconclusice) PROC SPEC METRIC at RETENTION inconclusive (PROC SPEC METRIC IMMEDIATE inconclusive)	

Undesirable Effects

How substantial are the undesirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS

○ Large ○ Moderate ○ Small ○ Trivial ○ Varies ● Don't know	There may be undesirable anticipated effects as there was significant variability across studies and outcomes, with some studies demonstrating outcomes favoring massed training. However, overall, we don't know about potential undesirable effects.	

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	All research evidence had high risk of bias, with inconsistency across studies and significant imprecision.	

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	There would be little variability or uncertainty in the value placed on the outcomes of interest, which were largely T1 measures of Time, Task Competency, and Specific Measures of Performance.	

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	With a very low certainty of evidence, looking at the higher weighted outcomes, there is moderate desirable effects with negligible undesirable effects favoring spaced training. However in some individual studies and in lower-weighted outcomes there were some studies with no difference or favoring massed training. As a result, there is uncertainty regarding the balance of effects.	

Equity

What would be the impact on health equity?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Reduced ○ Probably reduced ● Probably no impact ○ Probably increased	There is no research evidence regarding the impact on health equity.	If there were an increased resource allocation required for spaced-training, this would disadvantage underresourced groups, reducing health equity. However, the evidence from this study does not support or refute this notion and the research panel

○ Increased ○ Varies ○ Don't know		could not concieve of traional for how implementation of spaced training would impact equity in a significant way.

Acceptability

Is the intervention acceptable to key stakeholders?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ○ Probably yes ○ Yes ● Varies ○ Don't know	No research evidence was sought regarding acceptability.	PANEL: Interpretation is that spaced training would largely be acceptable to many stakeholders stakeholder levels (trainee - trainer - program - health system). The focus of this is the trainee-trainer dyad, more than the health system. There is likely also variability across interventions. For example mass casuality training (rare event) vs suturing an orange (more common).

Feasibility

Is the intervention feasible to implement?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ○ Probably yes ○ Yes ● Varies ○ Don't know	No research evidence was sought regarding acceptability.	PANEL = There are likely challenges of feasibility of some but not most stakeholders. This would be quite variable across contexts, people, and programs.

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**
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

We are unable to recommendation either spaced or massed training from the evidence found in this systematic review, and we recommend additional research to better understand in which settings, for which procedure, and for which trainees, and for which outcomes, spaced training maybe be superior to massed training.

Justification

Taking into account 15 RCTs comparing spaced vs massed training, mostly for physician trainees doing procedures or surgeries, measuring heterogeneous outcomes mostly in the simulated setting, there is a signal that spaced training may be advantageous over massed training. However, considering heterogeneity in findings across outcomes and settings, and very low certainty of evidence, we are unable to make a recommendation for either spaced or massed training.

Subgroup considerations

There were no specific subgroup considerations noted in this research.

Implementation considerations

Programs should involve simulation experts and other health professions educators to guide decisions regarding spaced-training to meet program specific requirements, considering the nature of their trainees, the procedures being trained, and the desired outcomes.

Monitoring and evaluation

Implementations of spaced-training should consider approaches to evaluation which measure the desired outcomes to ensure that the intended impact is being achieved.

Research priorities

We recommend additional research to better understand in which settings, for which procedure, and for which trainees, and for which outcomes, spaced training maybe be superior to massed training. Because most evidence found pertained to physicians, additional research is required to study the impact of spaced training on the acquisition of competence for healthcare professionals. Further, more studies of spaced-training measuring outcomes in the patient care setting, T2 and above, are required. Examples of targets of research would include: the measurement of performance (process) and product outcomes in real-world settings and the impacts of spaced training compared with massed training on patient morbidity, mortality, cost and resource use. In addition, to inform future GRADE processes, more large RCTs would be required to make more conclusive recommendations.

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