

Is bubble-blowing a more effective distraction method than video-watching for intravenous cannula insertion in young children? - a randomized controlled trial

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Background

- **Preoperative stress** is linked with negative outcomes and increases a child’s sympathetic response to pain¹⁻³
- **Distraction methods** reduce a child’s pain perception and anxiety by shifting their attention away from the perceived pain⁴
- **Bubble-blowing** = active distraction technique combining breathing exercises and play therapy to alleviate pain and anxiety⁵

Objective: To compare the effectiveness of two distraction techniques, bubble-blowing vs video-watching, in reducing **(1) pain** and **(2) anxiety** associated with intravenous (IV) cannula insertions in young children

Methods

REB-approved randomized controlled trial of 120 two- to five-year-old children (Fig 1) undergoing IV insertion for induction of general anesthesia in the medical imaging department

Primary outcome: Pain measured with the Face Legs Arms Cry Consolability scale (FLACC; scores from 0-10; higher scores indicate greater pain)⁶

Secondary outcome: Anxiety measured with the Modified Yale Preoperative Anxiety Score – Short Form scale (mYPAS-SF; scores from 22.9 – 100; higher scores indicate greater anxiety)⁷

Excluded: non-verbal, existing vascular access, pre-medication, insufficient topical anesthetic, mask induction

Analysis:

- Wilcoxon rank sum tests to compare groups (expected difference of 1.5 points on FLACC, effect size d = 0.55, alpha = 0.5, and power = 80%)
- Linear regression to assess the association of FLACC and mYPAS-SF scores with age, sex, and group

Results

Demographics

- Data collection from 120 participants completed in July 2024
 - 105 included: 52 video-watching (control) and 53 bubbles (intervention) distraction
 - 15 excluded: mask induction, premedication, or data unavailable
- 51 (49%) female, median [IQR (interquartile range)] age of 3.9 [2.9, 4.5] years

Primary outcome: Pain (n = 105)

- During IV insertion (T2), the median [IQR] FLACC score was 2.0 [0.0, 7.0] in the video-watching group and 2.0 [0.0, 5.0] in the bubble-blowing group; MD 0.0 (95% CI -1.0 to 1.0), p=0.888 (Fig 2)
- IV cannulation pain was higher than before IV insertions (T1) in 29/52 (56%) children in the video-watching group in 30/53 (57%) in the bubble-blowing group; odds ratio (OR) 0.97 (95% confidence interval [CI] 0.42 to 2.24), p>0.999
- Linear regression revealed a significant effect for the intercept, pre-insertion score, and age, but neither female sex nor bubble-blowing group allocation (Table 1)

Secondary outcome: Anxiety (n = 105)

- At T1, the median [IQR] mYPAS-SF score was 36.5 [22.9, 63.6] in the video-watching group and 27.1 [22.9, 52.1] in the bubble-blowing group; MD 0.0 (95% CI -10.4 to 0.0), p=0.178 (Fig 3)
- Anxiety at T1 was higher than at baseline (T0) in 27/52 (52%) in the video-watching group and 16/53 (30%) participants in the bubble-blowing group; OR 2.48 (95% CI 1.04 to 6.02), p=0.030
- Linear regression revealed a significant effect for the intercept and post-consent score, but neither age, female sex, nor bubble-blowing group allocation (Table 2)

Limitations & Further Research

- **Limitation:** Excludes children with higher anxiety levels who often receive premedication, mask inductions, and/or are non-verbal
- **Further Research:** specifically sample children with atypical development and/or elevated anxiety levels

Bubble-blowing does not reduce pain or anxiety more than video-watching during IV insertion in young children

Bubble-blowing may be an **option** for children who would benefit from active distraction during minor painful procedures



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Timeline

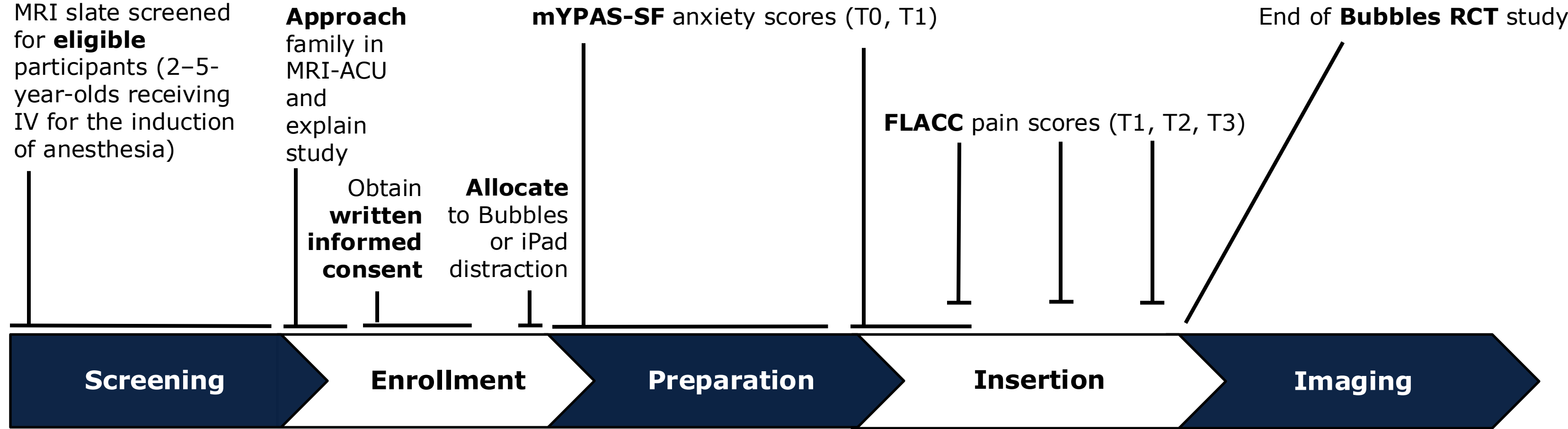


Figure 1: Bubbles randomized controlled trial study timeline. The protocol takes place in the medical imaging department and begins 90 minutes before a patient’s imaging up until IV insertion occurs before the induction of anesthesia.

Pain

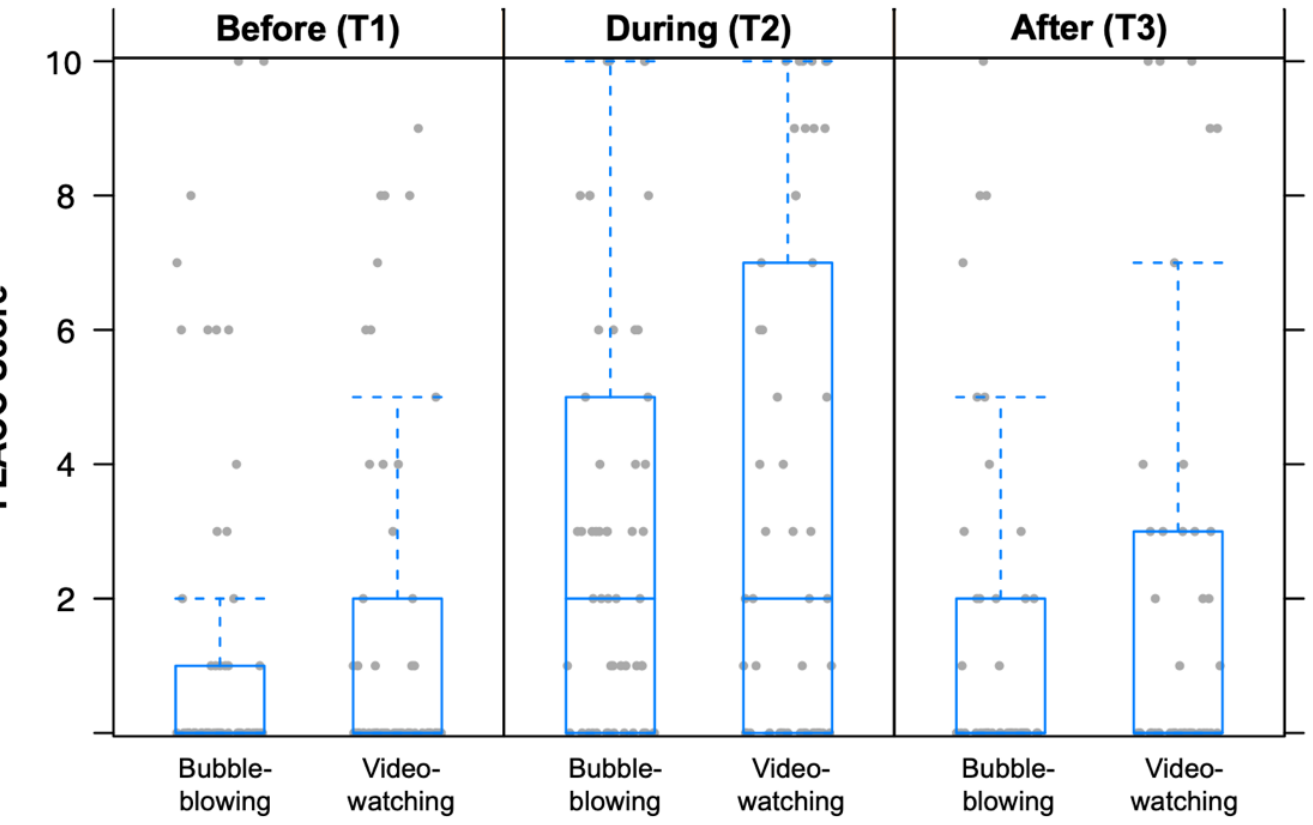


Table 1: Linear regression estimates for potential predictors of FLACC pain score during IV insertion.

	Estimate	95% CI	p-value
Intercept	4.4	2.2 to 6.6	<0.001
Pre-insertion score (T1, baseline)	0.7	0.5 to 0.9	<0.001
Sex (F)	0.2	-0.9 to 1.3	0.739
Age (years)	- 0.6	-1.2 to -0.1	0.019
Group (BB)	- 0.3	-1.4 to 0.7	0.532

Figure 2: Observational FLACC pain scores before (T1), during (T2), and after IV insertion (T3), comparing bubble-blowing versus video-watching distraction methods. Distraction methods were active at all time points. Groups were compared using Wilcoxon rank sum tests.

Anxiety

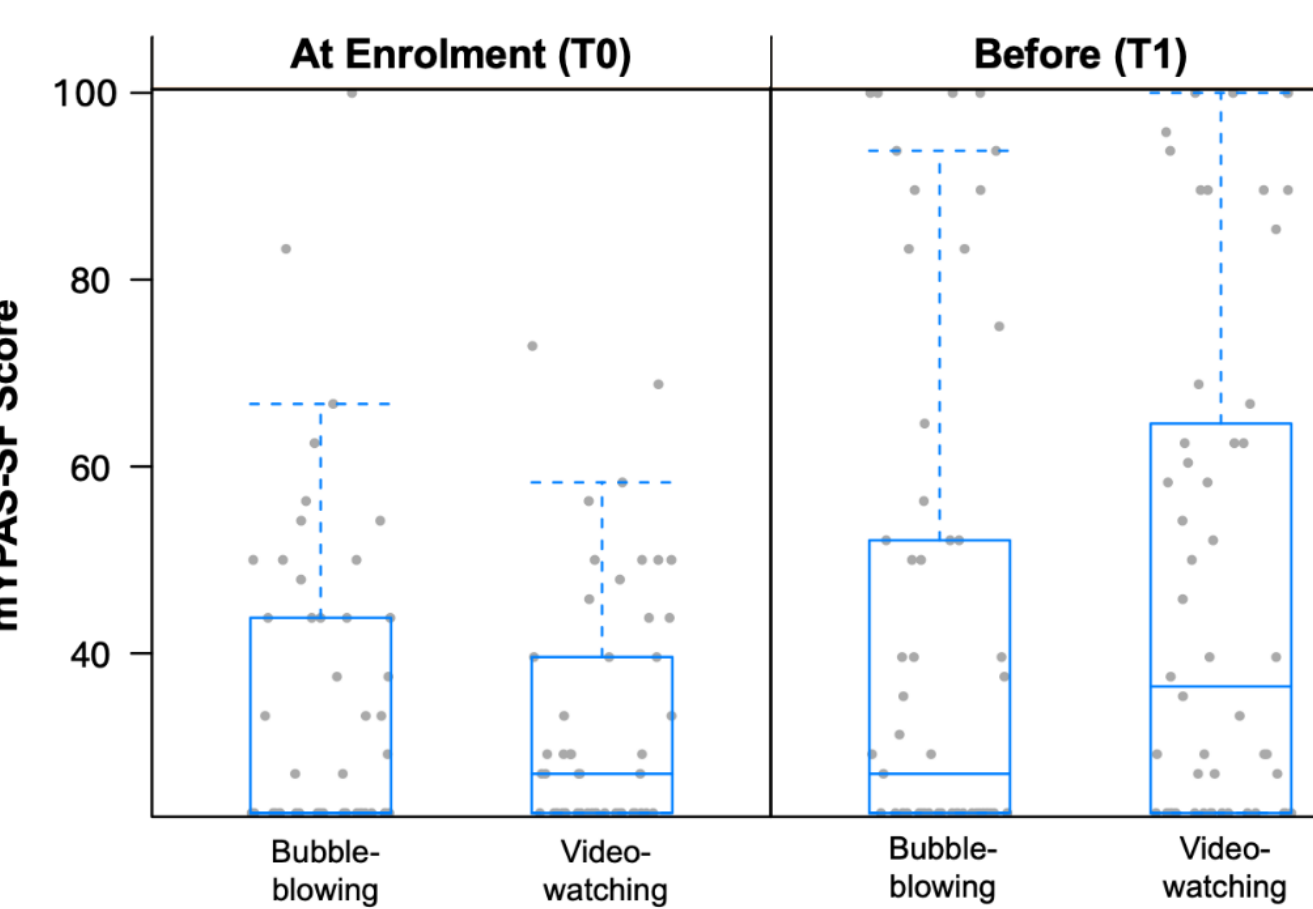


Table 2: Linear regression estimates for potential predictors of mYPAS-SF anxiety score directly before IV insertion.

	Estimate	95% CI	p-value
Intercept	34.8	10.2 to 59.4	0.007
Post-consent score (T0, baseline)	0.5	0.2 to 0.9	0.003
Sex (F)	- 0.6	-10.9 to 9.8	0.916
Age (years)	- 2.6	-7.5 to 2.3	0.305
Group (BB)	- 6.4	-16.6 to 3.9	0.225

Figure 2: Observational mYPAS-SF anxiety scores after consent (baseline, T0) and directly before IV insertion (T1), comparing bubble-blowing versus video-watching distraction methods. Distraction methods were active during the pre-procedure time point (T1). Groups were compared using Wilcoxon rank sum tests.

Acknowledgements



References

- [1] J Adv Nurs. 2014;70(2):243-55 [2] Child Care Health Dev. 2019;45(2):300–5 [3] BJA Educ. 2020;20(12):424-30 [4] Anesth Analg. 2021;132(3):798-806 [5] Pain Res Manag. 2022;2022:7817267 [6] Anesth Analg. 2014; 119(3):643-50 [7] Pediatr Nurs. 1998;23(3):293-7.