Comparative Effectiveness of Methods used to Learn Peripheral Intravenous Catheter Insertion in Chinese Nursing Students

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Conflict of Interest

- The authors declare no conflict of interest.

Wuhan University

Wuhan University

Educational Challenges

- Teaching peripheral intravenous catheter insertion (PICI)

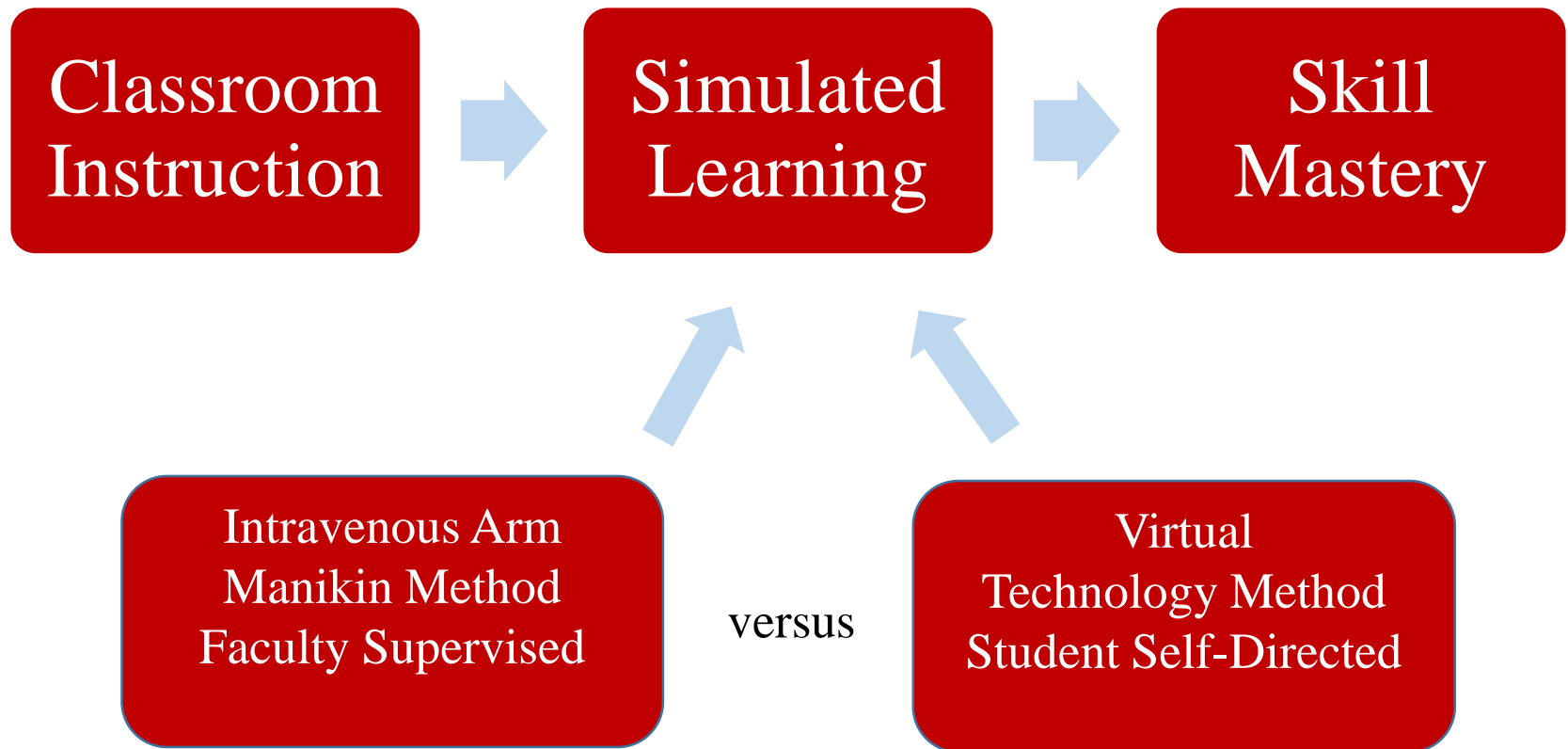- Student mastery of clinical practice skills

Learning Trends

- PICI evidence-based teaching & learning
- Intravenous arm manikin method
  - Known effectiveness in improving clinical outcome learner objectives
  - Established feasibility for faculty and students in time & effort
- Virtual technology method
  - Unknown effectiveness in improving clinical outcome learner objectives
  - Unclear feasibility for faculty and students in time & effort

Purpose

- To determine the effectiveness of using a new virtual technology method of learning peripheral intravenous catheter insertion compared to the existing intravenous arm manikin method on performance and comprehension of students enrolled in a fundamentals of nursing skills laboratory course in China

Framework

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Classroom          Simulated          Skill
Instruction   →    Learning     →     Mastery
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Intravenous Arm
Manikin Method
Faculty Supervised

versus

Virtual
Technology Method
Student Self-Directed

Specific Aims

- To evaluate the effectiveness of the new virtual technology method of practicing PICI compared to the existing intravenous arm manikin method under direct faculty supervision

Hypothesis

Compared to students randomized to the existing intravenous arm manikin method, students randomized to the new virtual technology method of learning PICI will demonstrate

a) Equivalent scores on PICI performance

b) Equivalent scores on comprehension of PICI concepts & patient safety principles

Method

- Two-group, randomized control trial
- Convenience sample
  - 68 Freshman BSN students
  - Aged 19–21 years
  - Enrolled in Nursing Fundamentals
  - Wuhan University in China
- No previous training in PICI
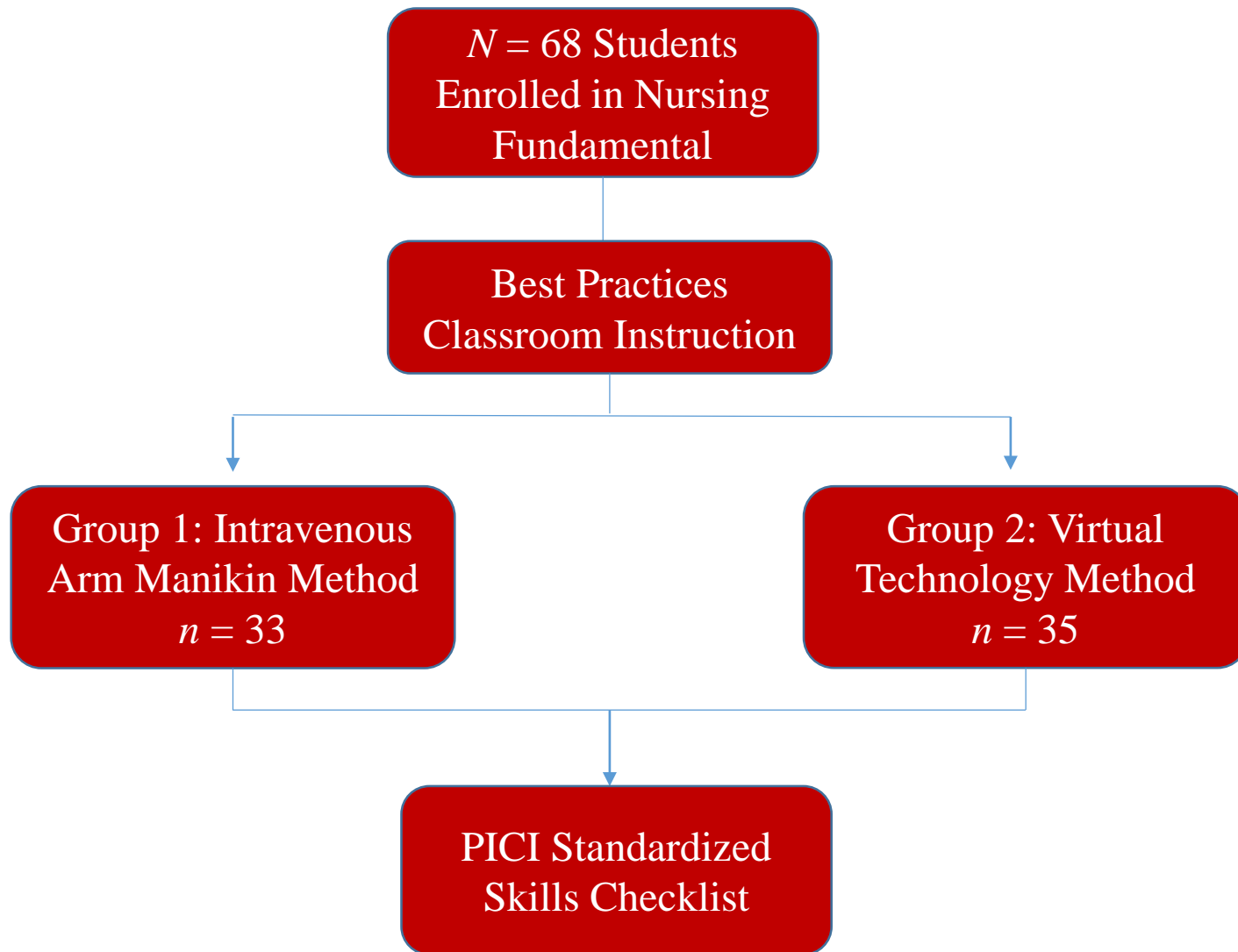
Measures: PICI Checklist

- Observational Performance Skills
  - 22-items
  - Weighted scores based on major & minor errors
  - Potential scores range from 0–100
- PICI-related Patient-Safety Principles & Concepts
  - 7-items
  - Dichotomous Yes/No response options where Yes = 1 & No =0
  - Supplemental prompts elicit clarifying rationale
  - Potential scores indicate Pass (7) or Fail (0–6)

Data Analysis

- Independent sample *t*-test
  - Differences between two group on performance

- *Chi*-square
  - Differences between two groups on the distribution of performance score
  - Differences between two groups on the distribution of comprehension scores

Skill Test Score

Group	Learning Method	N	M	SD	t-value	p
1	Intravenous Arm Manikin	33	80.45	11.94		
2	Virtual Technology Method	35	78.00	11.63	0.859	0.394

Distribution of Performance Scores

Group	Learning Method	Score > 60			Score > 90		
		Percent	x^2	p	Percent	x^2	p
1	Intravenous Arm Manikin	87.9			30.3		
2	Virtual Technology Method	82.9	0.34	0.735	17.1	1.64	0.258

Error Rate of PICI-related Patient-Safety Principles & Concepts

	Intravenous Arm Manikin Method	Virtual Technology Method	X^2	p
Citing the sequence of steps				
Yes	21	30	8.66	<0.01
No	14	3		
Demonstrating professional behavior				
Yes	2	13	11.2	<0.001
No	33	20		

Conclusions

- The new virtual technology method of learning PICI was deemed equivalent to using the existing intravenous arm manikin method.

- Students using the new virtual technology method demonstrated increased comprehension.

- Additional research is needed to estimate the cost savings.

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