

# The Influence of Low and High Fidelity Simulations on Nursing Students' Self-Confidence, Knowledge, and Satisfaction

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# Disclosure

- The authors declare no conflict of interest

# Objectives

- Review various uses of medical simulation
- Describe this research study, its questions, and methodology
- Discuss outcomes and recommendations for future study

# Why Use Medical Simulation?

- Re-create a clinical environment
  - Reduce anxiety
  - Improve performance
- Highly controlled to assure “same” experience for each student
- More predictable than working directly with humans
- Focus on learning in a “safe” place
- Practice technical skills, therapeutic communication, critical thinking, and clinical decision-making
- Video-recording and review promotes insight
- Improves performance in a “live” setting (Cant & Cooper, 2017)



# How is simulation used?

- Common, high anxiety
- Complex clinical scenarios
- Unpredictable experiences
- High risk situations
- Rare events



# Types of simulation

- **Low fidelity manikins**
  - Plastic
  - No physiologic functions
  - Cannot speak
  - Faculty at the bedside “channel” manikins
- **High fidelity human patient simulators**
  - Life-like skin, articulated joints
  - Computerized physiology responds as humans would
  - Can speak
  - Manikin control is from a remote location
  - Only students in the simulation room



# Low Fidelity Manikin – Devilbiss Hall: nursing building on campus



# Adult Health Room – Henson Medical Simulation Center





# Faculty View from a Control Room

CAE learningspace™

108 Adult Care LAB

Seldomridge, Lisa A

Video Review 00:01:35

**RECORD CONTROL**

Event: SU NURS 311 FALL 2016 Sim #2 (T)

Case: Mr./Mrs. Walters (altered mental st)

Group: ---

Learner: -- Select learner to add --

SP: -- Select SP to add --

Farmer, Alison × Forrest, Morgan ×

**ANNOTATIONS**

Search or add annotation

Preset annotations

108 ADULT CARE SIM LAB ceiling c...

108 ADULT CARE SIM LAB wall cam...

108 Adult care lab Ceiling cam 2

108 ADULT CARE SIM LAB wall cam...

# Research questions

- 1. What is the influence of a low fidelity simulation experience on students' satisfaction with learning using this pedagogy?
- 2. What is the influence of a low fidelity simulation experience on students' perceived confidence in performing a 60 second assessment, identifying and correcting any environmental safety hazards, completing a review of systems, and working as a team?
- 3. What is the influence of a high fidelity simulation experience on students' satisfaction with learning using this pedagogy?
- 4. What is the influence of a high fidelity simulation experience on students' perceived confidence in performing a 60 second assessment, identifying and correcting any environmental safety hazards, completing a review of systems, and working as a team?
- 5. Does participation in a high fidelity simulation experience influence student knowledge of caring for a patient who has just undergone surgery?

# Methods – 1

- **Permission to use instruments/IRB approval**
- **92 students enrolled in NURS 311 Care of Adults 1 Clinical**
- **First clinical course; no previous hospital care**
  - **Week 1 – low fidelity simulation (DH) – adults with diabetes**
  - **Week 2 – high fidelity simulation (HMSC) – adult who had appendix removed**
- **Students received information about their “patient” via online Learning Management System**
- **Given instructions about care responsibilities during simulation**
- **Online orientation to Henson Medical Simulation Center**

# Methods – 2

- **Week 1 – Low Fidelity Simulation**
  - Consent to participate in research
  - Assigned in pairs
  - Pre-briefing (10-15 minutes before the simulation begins)
  - Simulation (15-20 minutes)
  - Debriefing with a nursing faculty member (20-30 minutes)
  - Completed 13-item online NLN Student Satisfaction and Self-Confidence in Learning Survey (2015)
    - 5 point Likert scale, Strongly agree (5) to Strongly disagree (1)
    - Items 1-5 relate to satisfaction
    - Items 6-13 relate to self-confidence
    - Cronbach alpha = .94 (satisfaction) & .87 (self-confidence)

# Methods – 3

- **Week 2- High Fidelity Simulation**
  - Assigned in same pairs as Week 1
  - Completed 10-item knowledge inventory (post-op care)
  - Pre-briefing (10-15 minutes before the simulation begins)
  - Simulation (15-20 minutes) – Appendectomy after-care
  - Debriefing with a nursing faculty member (20-30 minutes)
  - Completed 13-item NLN Student Satisfaction and Self-Confidence in Learning Survey (2015)
    - 5 point Likert scale, Strongly agree (5) to Strongly disagree (1)
    - Items 1-5 relate to satisfaction
    - Items 6-13 relate to self-confidence
    - Cronbach alpha = .94 (satisfaction) & .87 (self-confidence)
  - Completed 10-item knowledge inventory (post-op care)

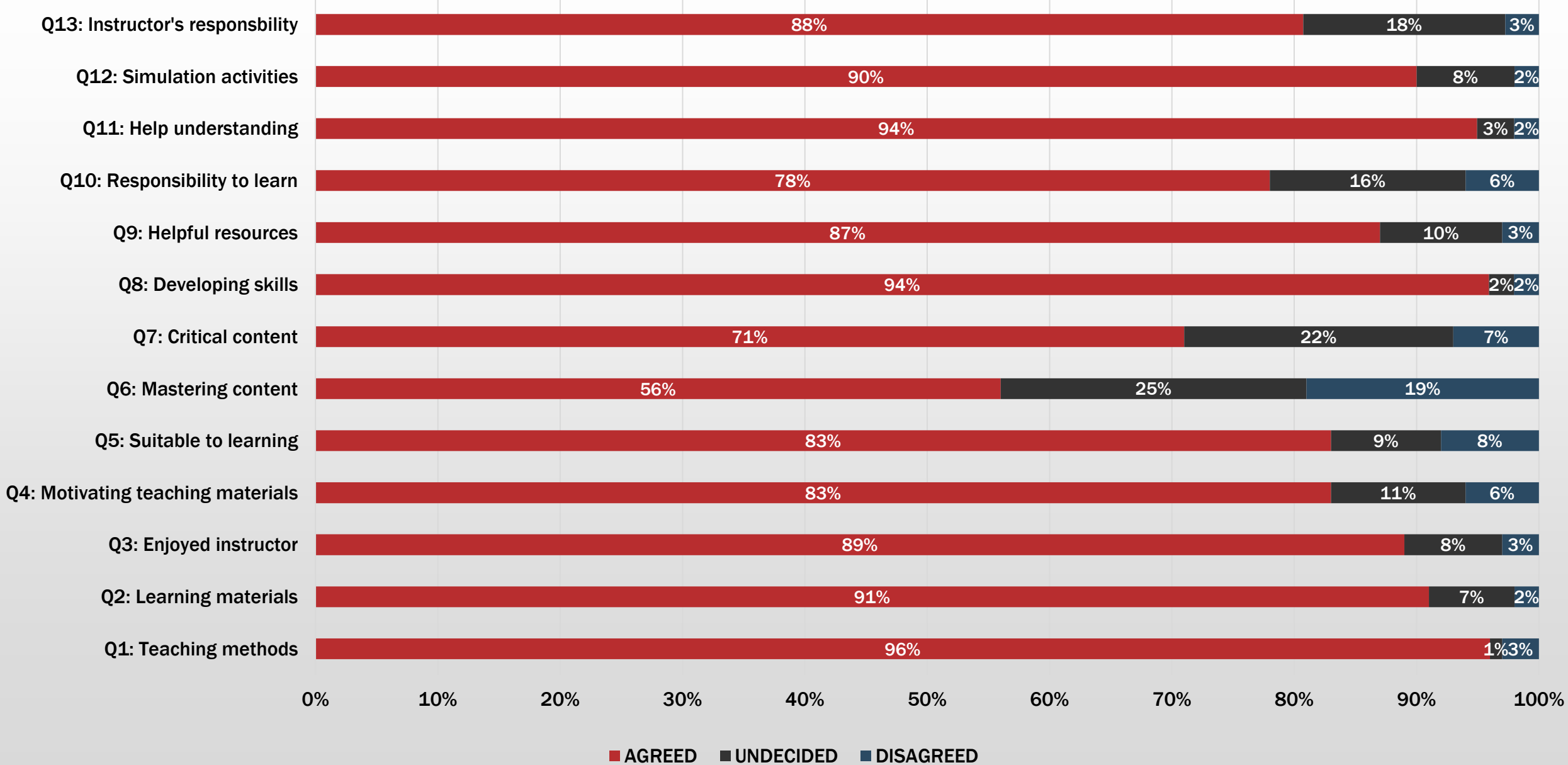
# Results – Question #1

- What is the influence of a low fidelity simulation experience on students' satisfaction with learning using this pedagogy?
- 86/92 students completed NLN survey = 93% response rate
- Satisfaction with learning using low fidelity simulation – 83-99% of respondents reported “strongly agree” or “agree”

# NLN Student Satisfaction and Self-Confidence in Learning Survey

## Post-Low Fidelity Simulation

n=86



# Results – Question #2

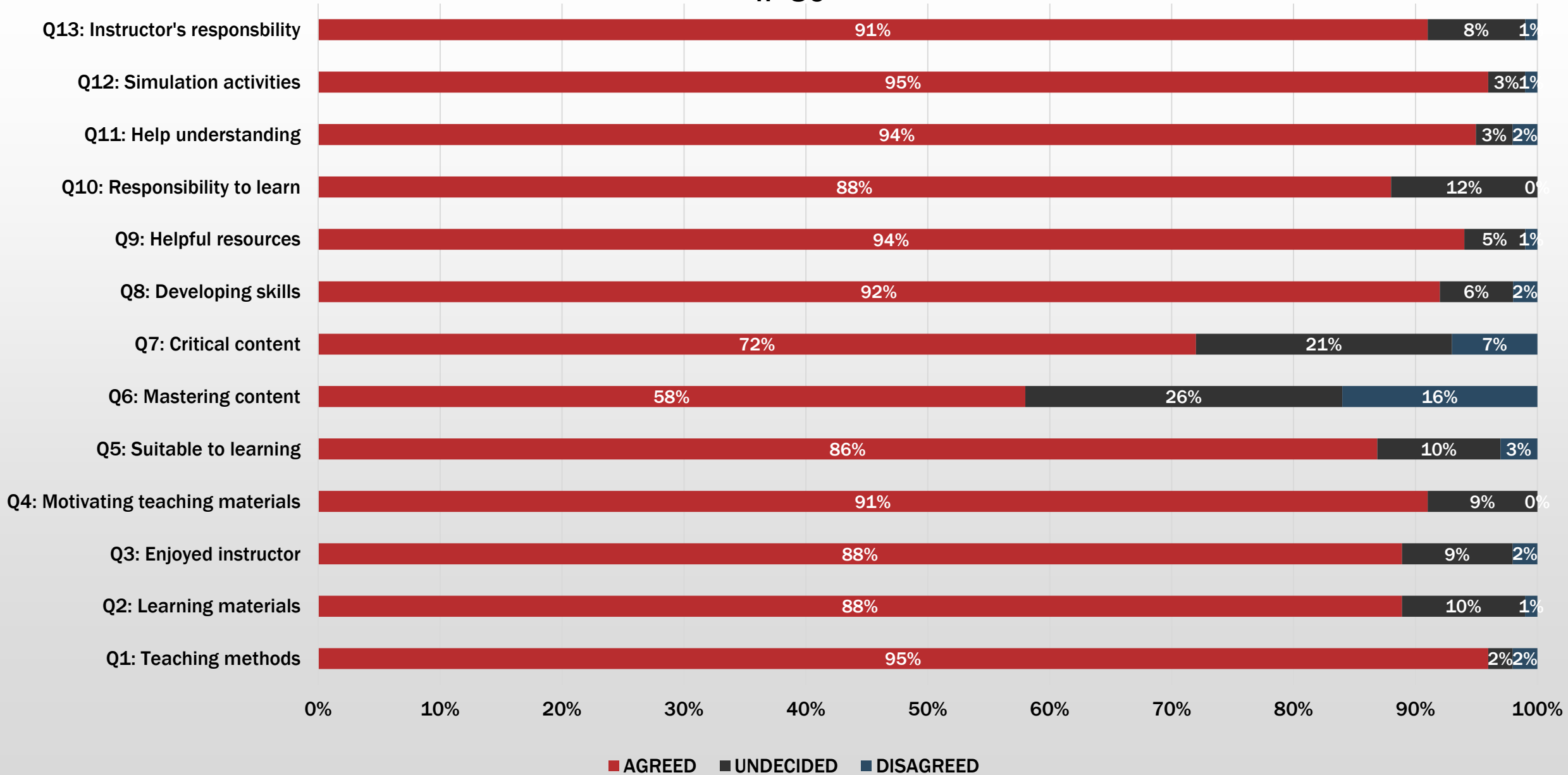
- What is the influence of a low fidelity simulation experience on students' perceived confidence in performing a 60 second assessment, identifying and correcting any environmental safety hazards, completing a review of systems, and working as a team?
- Overall satisfaction was high = 94% reporting “strongly agree” or “agree”



# NLN Student Satisfaction and Self-Confidence in Learning Survey

## Post-High Fidelity Simulation

n=86



# Results – Question #3

- What is the influence of a high fidelity simulation experience on students' satisfaction with learning using this pedagogy?
- High student satisfaction with high fidelity simulation 86-95% reporting “strongly agree” or “agree”
- Drop in satisfaction from low to high fidelity simulation may be due to increased anxiety associated with video recording during high fidelity simulations.

# Results – Question #4

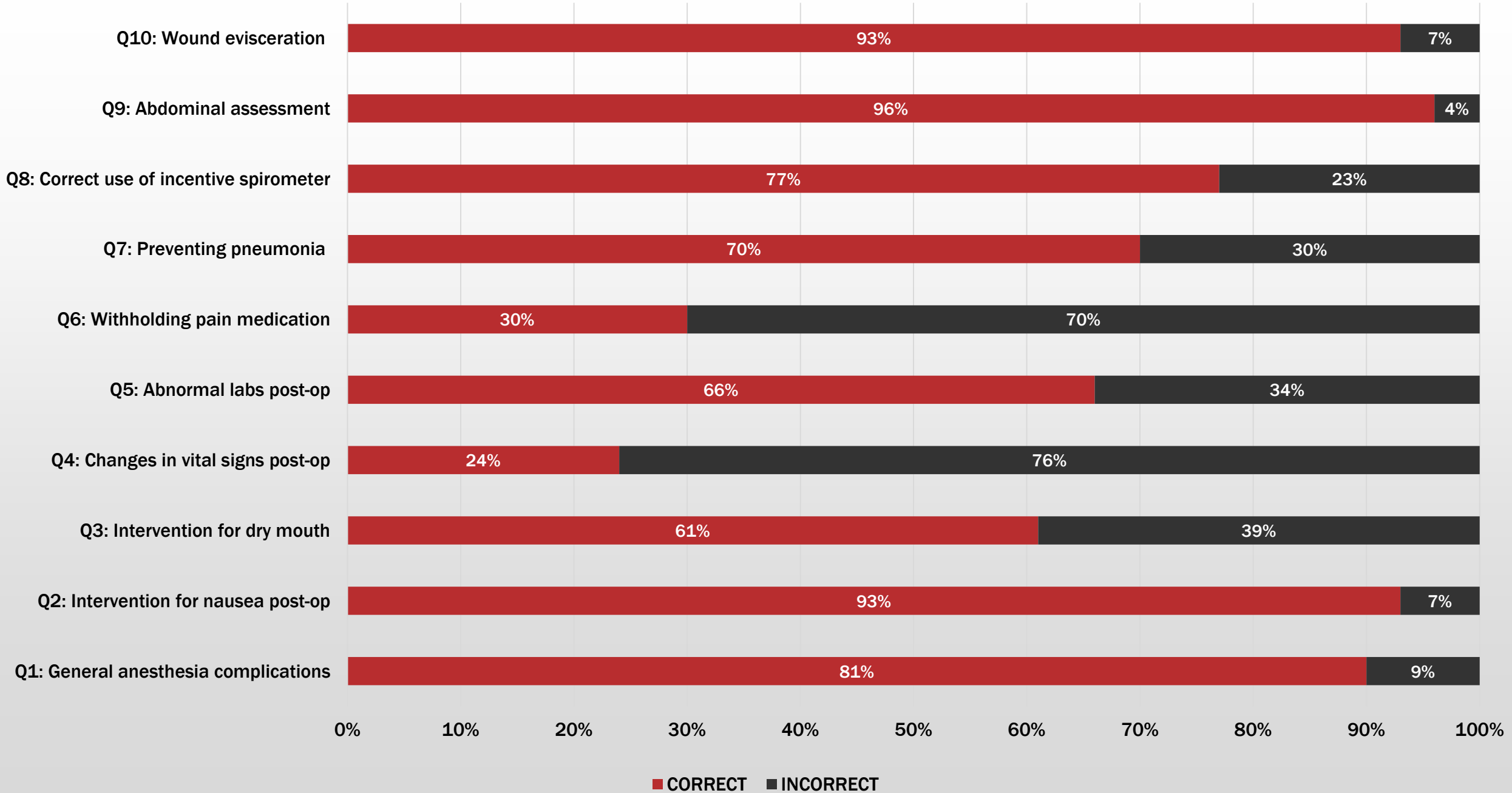
- What is the influence of a high fidelity simulation experience on students' perceived confidence in performing a 60 second assessment, identifying and correcting any environmental safety hazards, completing a review of systems, and working as a team?
- Overall confidence ratings were moderately high to high with 72-95% of students reporting that they “agreed” or “strongly agreed” that high fidelity simulation influenced their perceived confidence in performing the task.

# Results – Question #5

- Does participation in a high fidelity simulation experience influence student knowledge of caring for a patient who has just undergone surgery?
- A dependent *t*-test indicated that there was a statistically significant difference ( $p = .000$ ) between the two sets of scores.

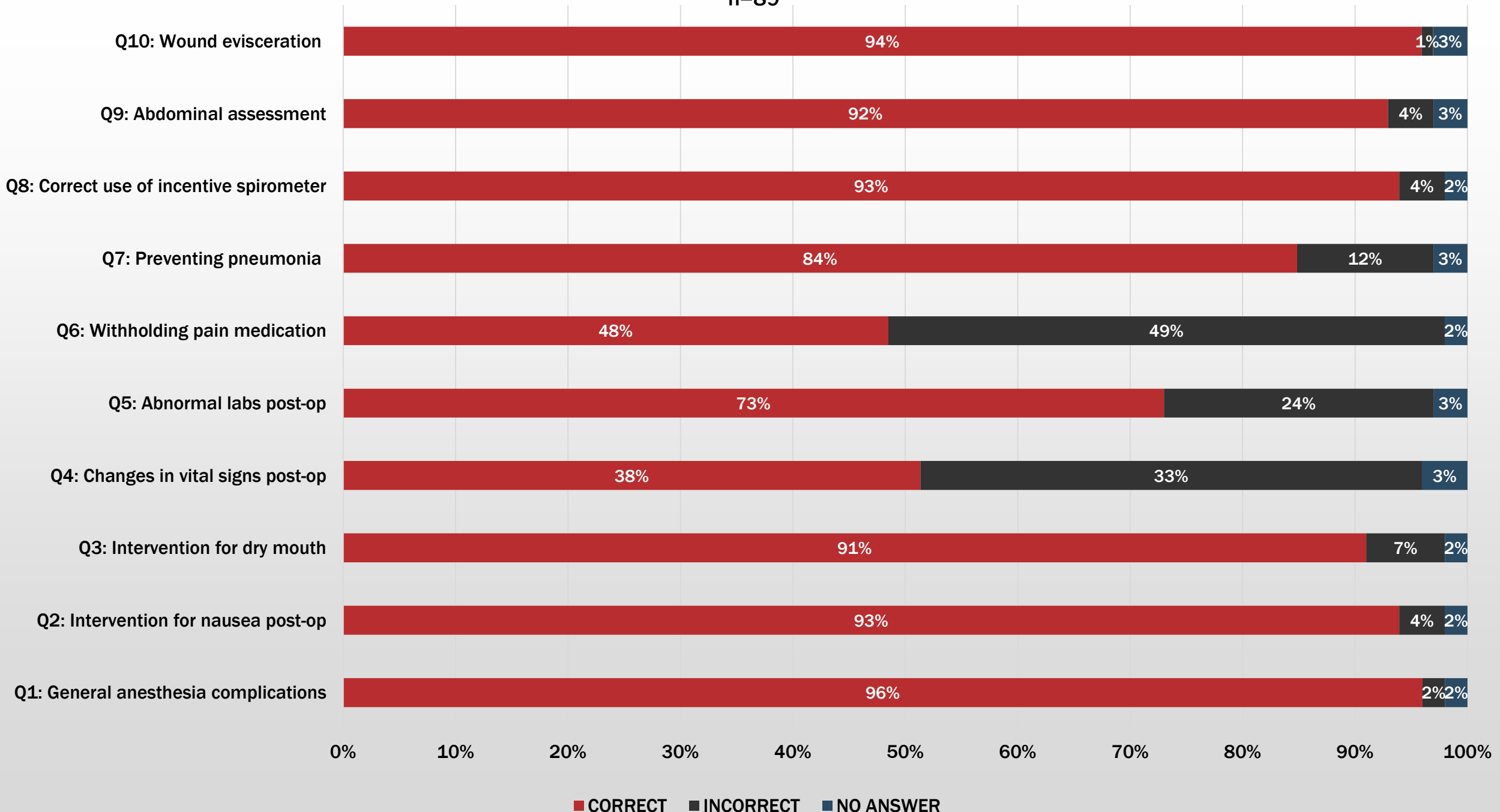
# Pre-Simulation Knowledge Inventory

n=90



# Post-Simulation Knowledge Inventory

n=89



# Discussion/Implications

- **Simulation appears to improve knowledge in the short term (Sportsman et al., 2011)**
  - What happens over time?
- **Students reported high satisfaction with low and high fidelity simulation (Mould, White & Gallagher, 2011; Schlairet, 2011)**
  - Satisfaction is high for both types of simulation.
  - How can faculty maximize access to high fidelity simulations?
- **Confidence levels were high after both low and high fidelity simulations (Partin et al., 2011; Schlairet, 2011)**
  - Did not measure baseline confidence levels
  - Are novices generally overconfident?
- **First time usage of Sim Center for NURS 311 faculty**
  - Modification of simulation may be needed

# Recommendations for Future Research

- Replicate with additional cohorts of students
- Consider replication at other schools with students at a similar point in their curricula
- Assess student confidence levels pre-simulation
- Measure knowledge pre and post low fidelity simulation
- Track confidence and knowledge at multiple points in the future
- Follow student performance with similar patients in “live” clinical settings



# Limitations

- **Single site**
- **Small sample**
- **No reliability/validity data on knowledge instrument**
- **NLN Student Satisfaction and Self-Confidence in Learning Survey not designed for pre-testing**
- **Longitudinal effects and translation to “live” clinical practice not studied**

# References

- Cant, R.P., & Cooper, S.J. (2017). The value of simulation-based learning in prelicensure nurse education: A state-of-the-art review and metaanalysis. *Nurse Education Today*, 27, 45-62.
- Foronda, C., Liu, S., & Bauman, E. (2013). Evaluation of Simulation in Undergraduate Nurse Education: An Integrative Review. *Clinical Simulation in Nursing*, 9(10), e409–e416, <http://dx.doi.org/10.1016/j.ecns.2012.11.003>
- Hayden, J.K., Smiley, R.A., Alexander, M., Kardong-Edgren, S., & Jeffries, P.R. (2014). The NCSBN national simulation study: A longitudinal, randomized, controlled study replacing clinical hours with simulation in prelicensure nursing education. *Journal of Nursing Regulation*, 5(2), 1-66. doi: [https://doi.org/10.1016/S2155-8256\(15\)30062-4](https://doi.org/10.1016/S2155-8256(15)30062-4)
- Mould, J., White, H., & Gallagher, R. (2011). Evaluation of a critical care simulation series for undergraduate nursing students. *Contemporary Nurse: A Journal for the Australian Nursing Profession*, 38(1), 180-190. <http://dx.doi.org/10.5172/conu.2011.38.1-2.180>
- NLN Student Satisfaction and Self-Confidence in Learning (2015) available at <http://www.nln.org/professional-development-programs/research/tools-and-instruments>
- Partin, J. L., Payne, T. A., & Slemmons, M. F. (2011). Students' perceptions of their learning experiences using high-fidelity simulation to teach concepts relative to obstetrics. *Nursing Education Perspectives*, 32(3), 186-188. <http://dx.doi.org/10.5480/1536-5026-32.3.186>
- Schlairet, M. C. (2011). Simulation in an undergraduate nursing curriculum: Implementation and impact evaluation. *Journal of Nursing Education*, 50(10), 561-568. <http://dx.doi.org/10.3928/01484834-20110630-04>.
- Sportsman, S., Schumacker, R. E., & Hamilton, P. (2011). Evaluating the impact of scenario-based high-fidelity patient simulation on academic metrics of student success. *Nursing Education Perspectives*, 32(4), 259-265. <http://dx.doi.org/10.5480/1536-5026-32.4.259>
- Victor, J., Ruppert, W., & Ballasy, S. (2017). Examining the relationships between clinical judgement, simulation performance, and clinical performance. *Nurse Educator*, 42(5), 236-239.