

SKILL DECAY IN ACUTE CARE SKILLS: *WHAT IS THE EVIDENCE, AND HOW CAN CLINICIANS COMBAT THESE EFFECTS?*

Jennifer K. Popp, EdD, LAT, ATC

March 9, 2017

Conflict of Interest Disclosure

- The views expressed in these slides and during today's discussion are mine.
- My views may not be the same as the views of my institution or my colleagues.
- Participants must use discretion when using the information contained in this presentation.

Learning Objectives

- At the conclusion of this presentation, participants will...
 - *Explain skill decay as it pertains to acute care clinical skills*
 - *Report the evidence associated with skill decay in health care professionals, including a timeline for when skills begin to decay*
 - *Generate feasible evidence-based methods to implement in order to combat skill decay*

Background and Significance



Did you know?

- The frequency of medical emergencies in athletics is low.
- Data gathered over 26-year period indicated 1,866 sudden deaths.¹
 - *0.6 deaths per 100,000 person-years*
 - *56% were most likely due to cardiovascular causes*
- Data gathered over 10-year period reported a total of 182 NCAA student-athlete sudden deaths.²
 - *Roughly 6 deaths/year due to cardiovascular causes*
 - *Many occurred outside the realm of athletic participation*

Background and Significance

■ Competence is KEY!!!

■ AHA Guidelines³

- *Emphasis on high-quality CPR*
- *Rate = 100-120 compressions per minute with minimal interruptions*
- *Depth = at least 2 inches (no more than 2.4 inches)*
- *Allow full chest recoil between compressions*



Background and Significance

■ Educational Experiences

- *Emergency response coursework*
- *Changes in educational standards through the years*

■ Continuing Education

- *ATs tend to select continuing education based on interests and applicability⁴*
- *Is acute care of interest? Is it applicable?*
- *Research does NOT support that individuals seek out continuing education based on need⁵*



Background and Significance

- ***Skill decay*** refers to the loss or lack of retention of trained or acquired skills after periods of nonuse.⁶
 - *Evidence for significant decay in acute care skills as the length of nonpractice of a skill increases.*⁵⁻¹²
- Acute care skills are not often utilized in clinical practice.



Background and Significance

■ Factors that negatively affect skill retention:⁷

- 1. *Insufficient hands-on practice*
- 2. *Inconsistent teaching*
- 3. *Unrelated course content*
- 4. *Complex instruction*
- 5. *Delays between instruction and skills practice*
- 6. *Lack of supervision*
- 7. *Low instructor feedback*
- 8. *Instructor incompetence*



Clinical Question

In athletic trainers, is there a decay in acute care skills over time?

SUMMARY OF SKILL DECAY LITERATURE



Yang et al.¹³ (Level of Evidence: 1)

- **Purpose:** Identify the retention of adult advanced life support knowledge and skills of healthcare providers following completion of an ALS course.
- **Methods:** Utilized Medline, CINAHL, Cochrane Library, and PubMed to conduct a literature search; retrieved 336 articles, but only 11 were included.
- **Results:**
 - *Duration of knowledge retention is greater than skills retention.*
 - *Patterns of decay increase at 6 months following training, but degree of decay varies.*
 - *There appears to be a relationship between clinical exposure and skill decay.*

Popp and Berry⁸ *(Level of Evidence: 2)*

- **Purpose:** Evaluate the retention of airway management knowledge and clinical skills in athletic training students.
- **Methods:** Participants underwent baseline assessment of clinical skills, engaged in an educational session, then re-assessed. Participants were divided into experimental group (re-assessed at 1-month, 3-months, and 6-months) and a control group (only re-assessed at 6-months).
- **Results:**
 - *Knowledge was retained at 6 months.*
 - *Clinical skills decayed significantly at 6-months.*

Ruetzler et al.⁹ (Level of Evidence: 3)

- **Purpose:** Investigate skill retention of intubation skills by previously inexperienced paramedics following training using a manikin model.
- **Methods:** Participants watched a standardized video lecture, participated in a practical demonstration, and were assessed (time to intubation, time to inflation, time to ventilation) on 7 different devices. Re-assessed 3 months later (no further training).
- **Results:**
 - *Decline in endotracheal intubation skills from 78% success rate to 58% success rate after 3 months.*
 - *100% success rate after 3 months for 5 out of 6 supraglottic airway devices, demonstrating that these devices are easy to use for inexperienced healthcare personnel.*

Ireland et al.¹⁰ (Level of Evidence: 3)

- **Purpose:** Investigate the ability of first responders to acquire and maintain competency in the application of an extrication cervical collar over a 12-month period.
- **Methods:** Participants attended a standardized training session followed by hands-on practice. The competency of participants was assessed using a 15-item checklist, and were requested not to practice the application of the cervical collar, and were re-assessed at 12-months.
- **Results:**
 - *Only 61% of participants maintained a level of competence at 12-months following training.*

Madden¹⁴ *(Level of Evidence: 3)*

- **Purpose:** Investigate the extent that nursing students acquire and retain CPR knowledge and skills following training.
- **Methods:** Participants underwent a pretest, engaged in a 4-hour CPR training program, underwent a post-test and re-testing at 10 weeks.
- **Results:**
 - *Decay in both knowledge and skills were found at 10 weeks following CPR training (compared to post-test scores); however, scores still were improved compared to pretest.*
 - *This study found that participants never acquired the CPR skills necessary for passing.*

Broomfield¹⁵ *(Level of Evidence: 3)*

- **Purpose:** Investigate the retention of basic CPR skills and knowledge by nurses following professional development.
- **Methods:** Participants underwent a pretest, engaged in a 3-hour CPR update, underwent a post-test and re-testing at 10 weeks.
- **Results:**
 - *Decay in both knowledge and skills were found at 10 weeks following CPR update; however, scores still were improved compared to pretest.*
 - *No differences between the rate at which skills and knowledge deteriorated, which contradicts most of the literature.*

Curry and Gass¹⁶ *(Level of Evidence: 3)*

- **Purpose:** To determine the rate of deterioration of knowledge and skills in CPR among physicians and nurses.
- **Methods:** Physicians and nurses were assessed on CPR knowledge and skills, engaged in CPR training, were re-assessed immediately after, and again at 6 months and 12 months.
- **Results:**
 - *After 6 months, skills in both groups decayed to near baseline levels.*
 - *Skills in both groups reached baseline levels at 12 months.*
 - *Furthermore, both physicians and nurses incorrectly perceived their skill level, with an illusion of competence.*

Conclusions from Skill Decay Literature

Let's Re-Visit our Clinical Question

In athletic trainers, is there

Any

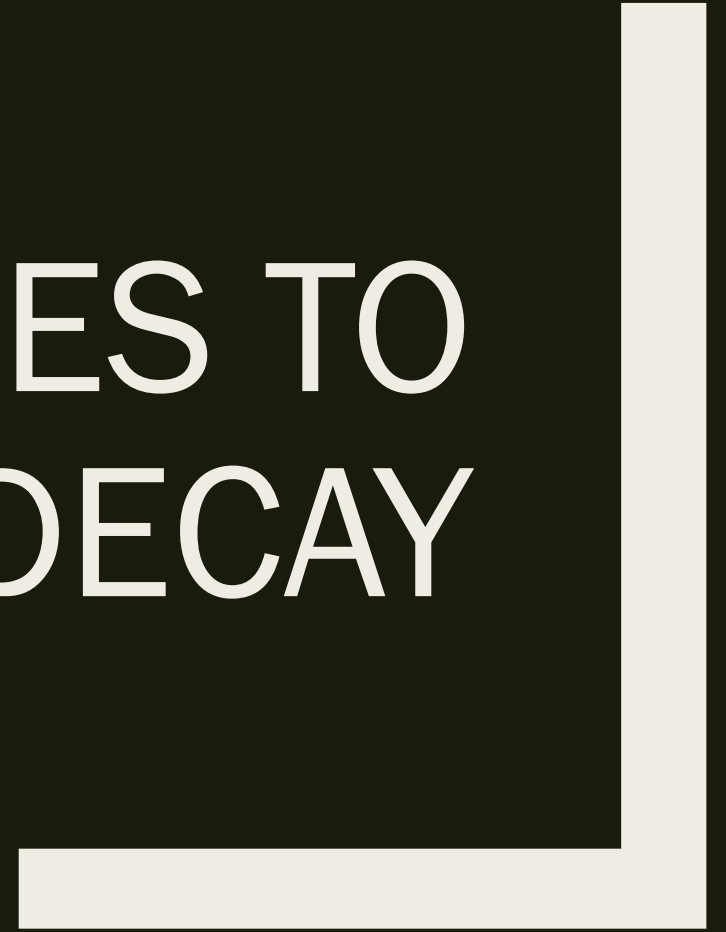
Is there a point to all of this?

to suggest that acute
health care professionals,
athletic trainers.

We
care

Grade of Evidence: B

STRATEGIES TO COMBAT SKILL DECAY



Clinical Question

Patient	Athletic Trainers who provide patient care in settings in which acute care skills may be implemented
Intervention	Educational strategies
Outcomes	ST: Prevent skill decay (i.e. retain skill) LT: Provide competent patient care

In athletic trainers, what educational strategies can be used to combat the decay of acute care skills?

Hein et al.¹⁷ *(Level of Evidence: 2)*

- **Purpose:** Develop a training program that provides student paramedics with initial knowledge and experience in laryngeal mask airway insertion skills, and also to provide ongoing skill retention.
- **Methods:** Initial training on clinical skills, randomized into two groups at 6 months: 1) intervention group, 2) control group, and then re-assessed.
- **Results:**
 - *Intervention group had significantly higher skill performance, shorter time to insertion, and fewer attempts to achieve success.*

Youngquist et al.⁵ *(Level of Evidence: 2)*

- **Purpose:** Determine the effect of pediatric airway management training on self-efficacy and skills to determine which retaining method is superior.
- **Methods:** Self-efficacy was measured prior to and following initial and retraining. Paramedics were trained to proficiency in bag-mask ventilation and endotracheal intubation on manikins. Assigned to one of 4 groups: 1) Control (no retraining), 2) Videotape Presentation, 3) Self-Directed Learning, and 4) Instructor-Facilitated Lecture and Demonstration. Retraining, followed by a second skills assessment.
- **Results:**
 - *Self-efficacy improved with initial and retraining, but a “gap” was found between self-efficacy and skill retention.*
 - *Noticeable skill decay after 6 months (majority unable to pass).*
 - *Lecture and demonstration format was superior to other retraining methods in this study.*

Kovacs et al.¹² *(Level of Evidence: 2)*

- **Purpose:** Determine natural history of airway management skill decay and examine the effect of independent practice and periodic feedback on skill maintenance.
- **Methods:** Health science students were initially trained, then assigned to one of three groups: 1) control, 2) independent practice plus periodic feedback, 3) periodic feedback only. Re-assessed at 16, 25, and 40 weeks.
- **Results:**
 - *Independent practice plus periodic feedback group maintained skill over time.*
 - *No differences amongst the other groups.*

Wayne et al.¹¹ (Level of Evidence: 3)

- **Purpose:** To evaluate simulation-based educational interventions on the retention of advanced cardiac life support skills of internal medicine residents.
- **Methods:** In a previous study, participants underwent initial training in ACLS using a simulation-based and deliberate practice training program, which resulted in 38% increased skills compared to a control group. There were no additional educational interventions, but simply re-assessment at 6-months and 14-months following training.
- **Results:**
 - *Residents maintained their skills at 6-months and 14-months following the intervention.*

Conclusions from Literature Related to Educational Strategies to Combat Skill Decay

Let's Re-Visit our Clinical Question

In athletic trainers, what
com

Now... what's your point?

...be useful, it appears as
and feedback is most beneficial to
maintaining skill.

Grade of Evidence: C

CONCLUSIONS



Conclusions

Skill Decay

- Acute care skills decay significantly at 6 to 12 months following training.

- Self-assessment skills do not decay
- 
- Caution:**
More research is needed in this area!

Educational Interventions

- Studies have shown that educational interventions lead to improved knowledge and skills, but the impact on patient outcomes is less clear.
- 
- Caution:**
More research is needed in this area!

CLINICAL BOTTOM LINE



Educators

- **Need to evaluate our teaching strategies.**
 - *Not all educational techniques are effective.*
 - *Perhaps simulation-based training will allow for better retention of skills.*

- **Instill the importance of regular rehearsal of skills with a planned, deliberate approach.**
 - *Annual in-service training*
 - *Deliberate practice with supervision*
 - *Simulation experiences*
 - *IPE/IPP activities*



Clinicians

- Acute care skills decay significantly between 6 months and 1 year after training.
 - *Self-efficacy may not deteriorate as rapidly as skill.*
- We have an ethical and legal responsibility to remain competent.
- Regular rehearsal, utilizing a combination of hands-on practice with expert feedback.
 - *Prior to the start of pre-season (e.g. In-Service Day)*
 - *IPE/IPP activities at the local hospital/clinic*
 - *Staff training*
 - *Work with local education programs*



Questions?



Jennifer Popp, EdD, ATC, LAT
Ball State University
jkpopp@bsu.edu

References

- 1. Maron BJ, Doerer JJ, Haas TS, Tierney DM, Mueller FO. Sudden deaths in young competitive athletes: Analysis of 1866 deaths in the United State, 1980-2006. *Circulation*. 2009;119:1085-1092.
- 2. Maron BJ, Hass TS, Murphy CJ, Ahluwalia A, Rutten-Ramos S. Incidence and causes of sudden death in U.S. college athletes. *J Am Coll Cardiol*. 2014;63(16):1636-1643.
- 3. Highlights of the 2015 American Heart Association Guidelines Update for CPR and ECC. <http://eccguidelines.heart.org/wp-content/uploads/2015/10/2015-AHA-Guidelines-Highlights-English.pdf>, accessed October 1, 2016.
- 4. Walker SE, Pitney WA, Lauber CA, Berry D. An exploration of athletic trainers' perceptions of the continuing education process. *The Internet Journal of Allied Health Sciences and Practice*. 2008;6(2):Article 5
- 5. Youngquist ST, Henderson DP, Gausche-Hill M, Goodrich SM, Poore PD, Lewis RJ. Paramedical self-efficacy and skill retention in pediatric airway management. *Acad Emerg Med*. 2008;15(2):1295-1303.
- 6. Arthur W, Bennett W, Stanush PL, McNelly TL. Factors that influence skill decay and retention: A quantitative review and analysis. *Human Perf*. 1998;11(1):57-101.
- 7. Smith KK, Gilcrease D, Pierce K. Evaluation of staff's retention of ACLS and BLS skills. *Resuscitation*. 2008;78(59-65).
- 8. Popp JK, Berry DC. Athletic training students demonstrate airway management skill decay, but retain knowledge over six months. *Athl Train Ed J*. 2016;11(4):173-180.
- 9. Ruetzler K, Roessler B, Potura L, Priemayr A, Robak O, Schuster E, et al. Performance and skill retention of intubation by paramedic using seven different airway devices—a manikin study. *Resuscitation*. 2011;82:593-597.
- 10. Ireland CJ, Zietz KM, Bridgewater FHG. Acquiring and maintaining competence in the application of extrication cervical collars by a group of first responders. *Prehospital and Disaster Medicine*. 2008;23(6):530-536

References

- 11. Wayne DB, Siddall VJ, Butter J, Fudala MJ, Wade LD, Feinglass J, et al. A longitudinal study of internal medicine residents' retention of advanced cardiac life support skills. *Acad Med*. 2006;81(10 Supp):S9-S12.
- 12. Kovacs G, Bullock G, Ackroyd-Stolarz S, Cain E, Petrie D. A randomized controlled trial on the effect of educational interventions in promoting airway management skill maintenance. *Ann Emerg Med*. 2000;36(4):301-309.
- 13. Yang CW, Yen ZS, et al. A systematic review of retention of adult advanced life support knowledge and skills in healthcare providers. *Resuscitation*. 2012;83:1055-1060.
- 14. Madden C. Undergraduate nursing students' acquisition and retention of CPR knowledge and skills. *Nurse Educ Today*. 2006;26:218-227.
- 15. Broomfield R. A quasi-experimental research to investigate the retention of basic cardiopulmonary resuscitation skills and knowledge by qualified nurses following a course in professional development. *J Adv Nurs*. 1996;23(5):1016-1023.
- 16. Curry L, Gass D. Effects of training in cardiopulmonary resuscitation on competence and patient outcome. *CMAJ*. 1987;137:491-496.
- 17. Hein C, Owen H, Plummer J. A training program for novice paramedics provides initial laryngeal mask airway insertion skill and improves skill retention at 6 months. *Sim Healthcare*. 2010;5:33-39.