First Aid Education as Translational Science

Transferring Research to Practice

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Conflicts of Interest

- David C. Berry
  - FINANCIAL DISCLOSURE:
    - American Red Cross Travel Grant.
  - UNLABELED/UNAPPROVED USES DISCLOSURE:
    - No relevant financial relationship (s) exist.
  - AFFILIATIONS
    - American Red Cross Scientific Advisory Board
    - ILCOR First Aid Task Force Member
  - Statements, opinions, and recommendations contained are mine unless otherwise indicated.
  - Participants must use discretion and clinical reasoning when using the information contained in this presentation.

Context

To **IMPROVE** patient care; scientific discoveries, devices and best practice (EBP) must be translated into clinical applications.

Objective

To introduce the concept of first aid education research as translational science and provide an example of its application.

Please at any point, feel free to offer insight, suggestions, dialogue.

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Background

The knowledge and skills needed by first aid providers to reduce morbidity and mortality by alleviating suffering, preventing further illness or injury, and promoting recovery **EXISTS**.

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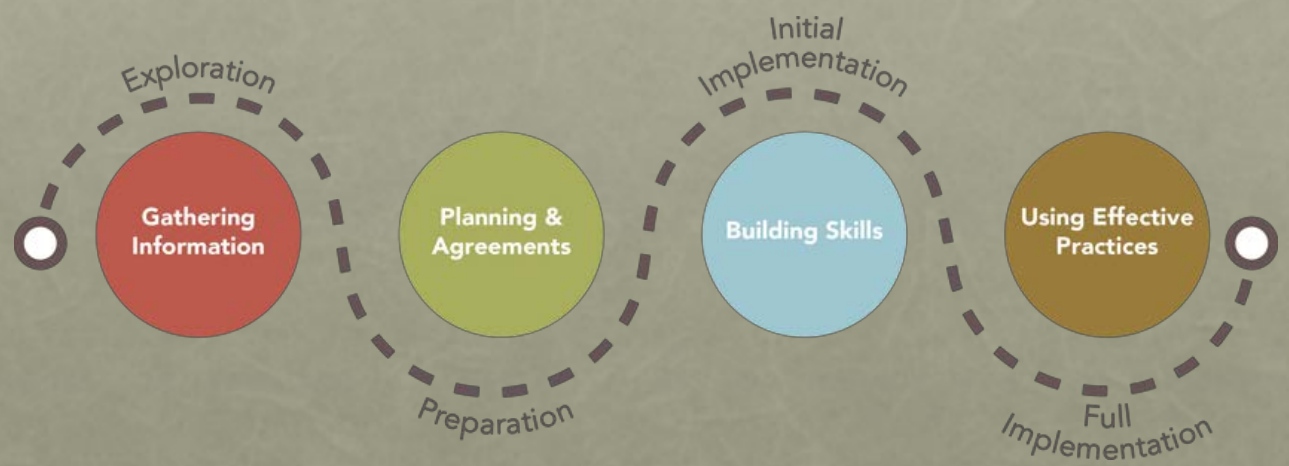
Background

And while local, state, or provincial regulatory requirements may limit the ability to implement some recommended first aid recommendations…

many first aid providers and/or educators; for numerous reasons ***DON'T always implement EBP.***



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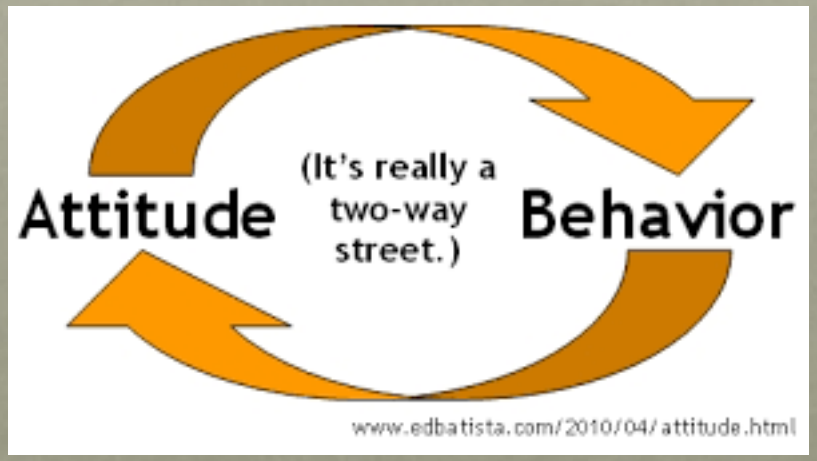
Background

It is important that educational strategies translate into **IMPROVED ATTITUDES** toward implementing EBP related to emergency care and improved patient care and outcomes.



So… how do we accomplish this?

Applying/understanding a ***translational science*** approach to first aid education and educational research.

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The JBI Model of EBP

The Joanna Briggs Institute (JBI) Model is developmental and, building on frameworks that have evolved, was constructed out of experience within the evidence-based practice field.

Pearson A, Jordan Z, Munn Z. Translational science and evidence-based healthcare: A clarification and reconceptualization of how knowledge is generated and used in healthcare. *Nursing Research and Practice.* 2012;Article ID 792519. http://dx.doi.org/10.1155/2012/792519.

The JBI Model of EBP

EBP can be conceptualized as **clinical decision making** that considers…

1. best available **evidence**
2. the context in which the care is delivered
3. client preference and
4. the professional judgment (attitude) of the health professional or first aid provider.

Pearson A, Jordan Z, Munn Z. Translational science and evidence-based healthcare: A clarification and reconceptualization of how knowledge is generated and used in healthcare.
Nursing Research and Practice. 2012;Article ID 792519. http://dx.doi.org/10.1155/2012/792519.

The JBI Model of EBP

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- 4 components of EBP:
  - Healthcare evidence generation
  - Evidence synthesis
  - Evidence (knowledge) transfer
  - Evidence utilization

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The JBI Model of EBP

Healthcare Evidence Generation

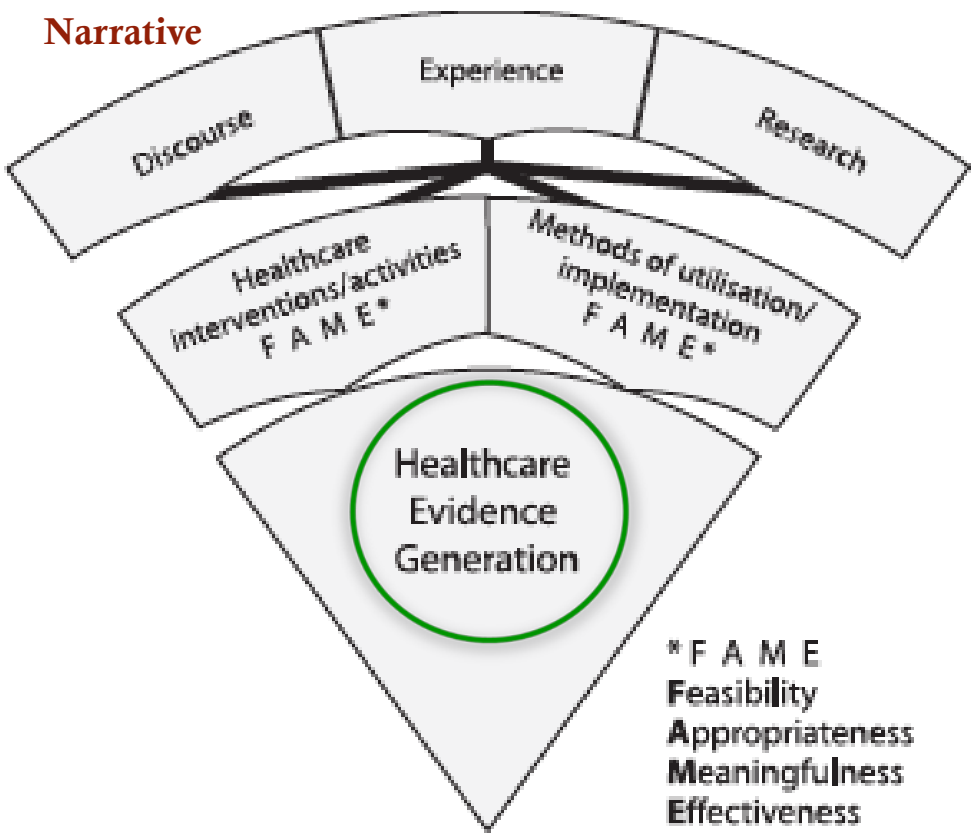

Figure 2 Healthcare evidence generation.

Pearson A, Jordan Z, Munn Z. Translational science and evidence-based healthcare: A clarification and reconceptualization of how knowledge is generated and used in healthcare. *Nursing Research and Practice.* 2012;Article ID 792519. http://dx.doi.org/10.1155/2012/792519.

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The JBI Model of EBP

Healthcare Evidence Generation

- Evidence of "***feasibility***"
  - …extent to which an activity is ***practical*** and ***practicable***.
  - Clinical feasibility is about whether or not an activity or intervention is physically, culturally or financially practical or possible within a given context.

Pearson A, Jordan Z, Munn Z. Translational science and evidence-based healthcare: A clarification and reconceptualization of how knowledge is generated and used in healthcare. *Nursing Research and Practice.* 2012;Article ID 792519. http://dx.doi.org/10.1155/2012/792519.

The JBI Model of EBP

Healthcare Evidence Generation

- Evidence of "***appropriateness***"
  - …extent to which an ***intervention or activity fits*** with or is apt in a situation.
  - Clinical appropriateness is about how an activity or intervention relates to the context in which care is given.

Pearson A, Jordan Z, Munn Z. Translational science and evidence-based healthcare: A clarification and reconceptualization of how knowledge is generated and used in healthcare. *Nursing Research and Practice.* 2012;Article ID 792519. http://dx.doi.org/10.1155/2012/792519.

The JBI Model of EBP

Healthcare Evidence Generation

- Evidence of "***meaningfulness***"
  - …extent to which an ***intervention or activity is positively experienced*** by the patient.
  - Meaningfulness relates to the personal experience, opinions, values, thoughts, beliefs and interpretations of patients or clients.

Pearson A, Jordan Z, Munn Z. Translational science and evidence-based healthcare: A clarification and reconceptualization of how knowledge is generated and used in healthcare. *Nursing Research and Practice.* 2012;Article ID 792519. http://dx.doi.org/10.1155/2012/792519.

The JBI Model of EBP

Healthcare Evidence Generation

- Evidence of "***effectiveness***"
  - …extent to which an intervention, when used appropriately, ***achieves the intended effect***.
  - Clinical effectiveness is about the relationship between an intervention and clinical or health outcomes.

Pearson A, Jordan Z, Munn Z. Translational science and evidence-based healthcare: A clarification and reconceptualization of how knowledge is generated and used in healthcare. *Nursing Research and Practice.* 2012;Article ID 792519. http://dx.doi.org/10.1155/2012/792519.

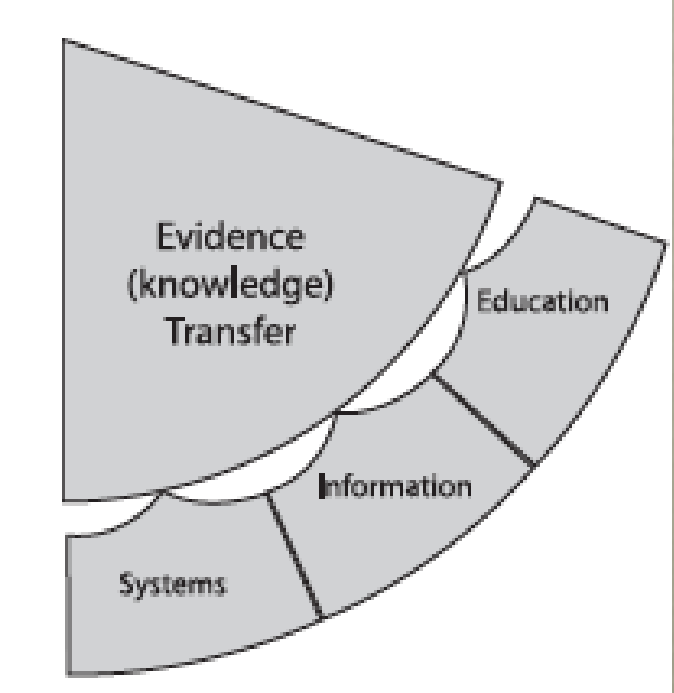
The JBI Model of EBP

Evidence Synthesis

- ***Evidence synthesis***
  - Evaluation or analysis of research evidence and opinion on a specific topic to aid in decision-making in healthcare – is conceptualized as consisting of 3 elements:
    - Theory
    - Methodology
    - Systematic review of evidence

The JBI Model of EBP

Evidence Transfer



- ***Evidence transfer***
  - Act of transferring knowledge to individual health professionals, health facilities and health systems globally by means of journals, other publications, electronic media, **education and training and decision support systems**.
  - Fundamental to this process is:
    - Developing **understandable** & **actionable** messages to **ALL** stakeholders
    - Accommodating the context of a target audience's information needs
    - **Delivering messages in cost-effective, meaningful ways** (information technology, print material, meetings, workshops and training programs).

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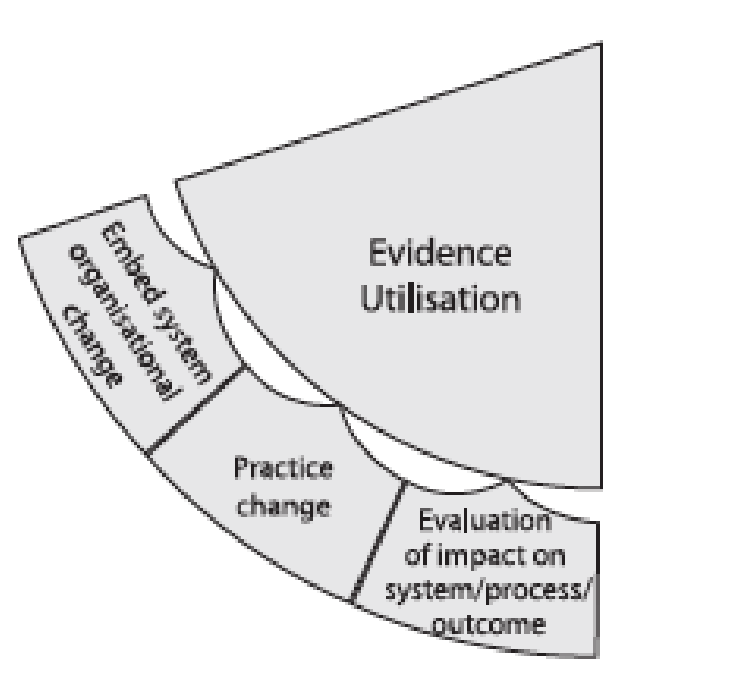
The JBI Model of EBP

Evidence Utilization

- ***Evidence utilization***
  - Implementation of evidence in practice, as is evidenced by practice and/or system change.
  - Identifies three elements
    - **Practice change**
    - **Embedding evidence** through system/organizational change
    - **Revaluating the impact of the utilization of evidence** on the health system, the process of care and health outcomes



The JBI Model of EBP

Conclusion

Clinical Bottom Line

The JBI model of evidence-based healthcare has been constructed to enable reasoning and critique about evidence-based healthcare and its role in improving global health, within a logical conceptual framework.

So.. how can I get a student's attention regarding what they don't know or rather have not TRANSLATED?

Example Scenario

You witness a football player at a high school football program in Alabama gently collapse 2.5 hours into the 6th day of pre-season in-between running plays.

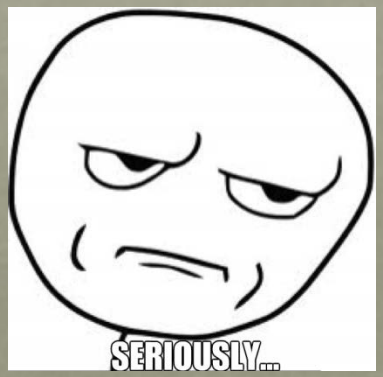
Arriving on-scene the athlete presents with dizziness, drowsiness, irrational behavior, confusion, irritability, emotional instability, rapid and thready pulse, and labored breathing.

He appears to have an established airway, adequate breathing, and circulation.

Example Scenario

- As part of the differential diagnosis you decide you need to distinguish between-
  - Hyponatremia
  - Exertional heat stroke, and
  - Traumatic brain injury

- NOW GO



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Example Scenario

Athlete has now gone into respiratory arrest.

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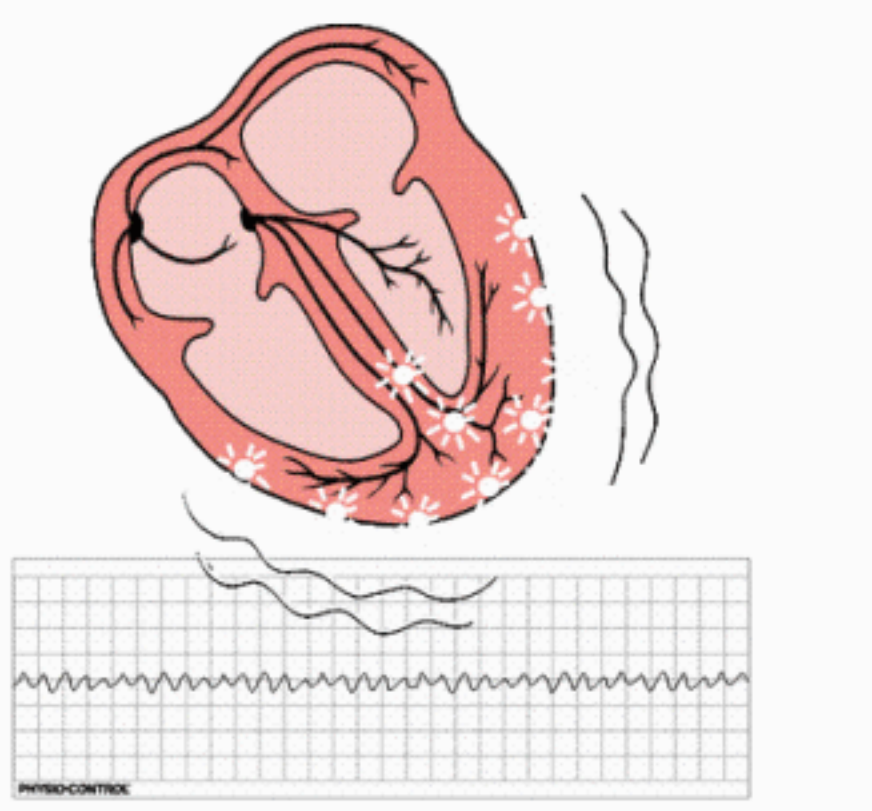
Example Scenario

Athlete is now in cardiac arrest.



Example Scenario… Take 2!

- Two different student volunteers!

Example Scenario… Take 2!

- You witness a football player at a high school football program in Alabama gently collapse 2.5 hours into the 6th day of pre-season in-between running plays.
- Arriving on-scene the athlete presents with dizziness, drowsiness, irrational behavior, confusion, irritability, emotional instability, rapid and thready pulse, and labored breathing.
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Example Scenario… Take 2!

- As part of the differential diagnosis you decide you need to distinguish between-
  - Hyponatremia
  - Exertional heat stroke, and
  - Traumatic brain injury

- NOW GO

Example Scenario… Take 2!

Athlete has now gone into **respiratory arrest**.

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Example Scenario… Take 2!

Athlete is now in cardiac arrest.

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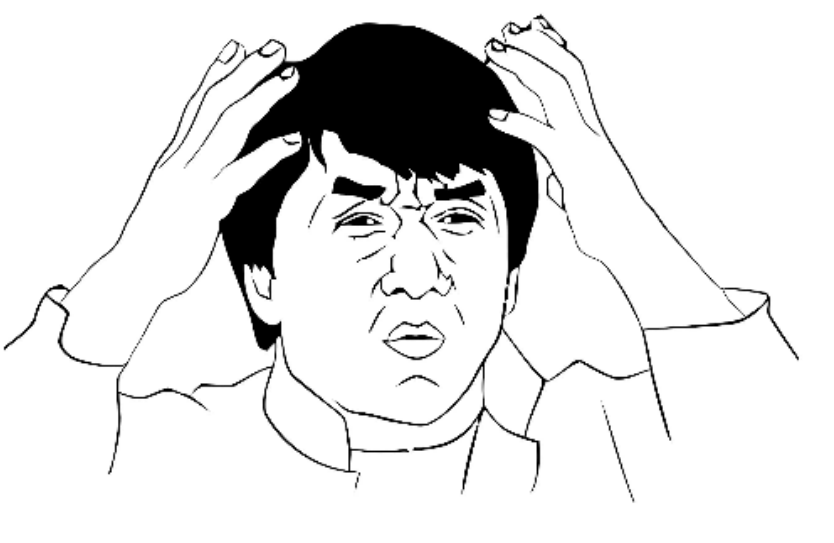
So… one key to translating is debriefing?

- Would anyone have handled this situation differently?
- What was missing?
- Why was it missing?

So… one key to translating is debriefing?

How many actually have a flexible probe thermistor or other emergency equipment (tarp, CPR mask, BVM) in your preceptor's kit?

WHY NOT?!?



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So… one key to translating is debriefing?

Would the missing equipment be in your emergency kit, it's the gold standard?

So… one key to translating is debriefing?

Journal of Athletic Training 2002;37(1):99–104

www.journalofathletictraining.org

National Athletic Trainers' Association Position Statement: Emergency Planning in Athletics

J. C. Andersen*; Ronald W. Courson†; Douglas M. Kleiner‡; Todd A. McLoda§

Journal of Athletic Training 2012;47(1):96–118

www.nata.org/jat

position statement

National Athletic Trainers' Association Position Statement: Preventing Sudden Death in Sports

Journal of Athletic Training 2007;42(1):143–158

www.journalofathletictraining.org

communications

Inter-Association Task Force Recommendations on Emergency Preparedness and Management of Sudden Cardiac Arrest in High School and College Athletic Programs: A Consensus Statement

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So… one key to translating is debriefing?

Why is event planning important?

Who or what types of events are you/we planning for?

When planning, what types of documents should be utilized to assist in limiting legal liability?

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Ok… so what about translational science?

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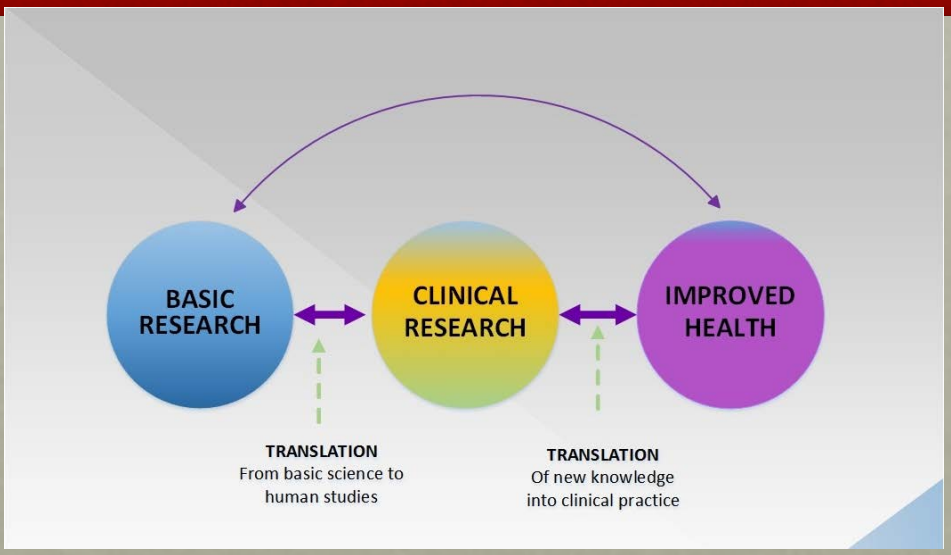
Translational Science

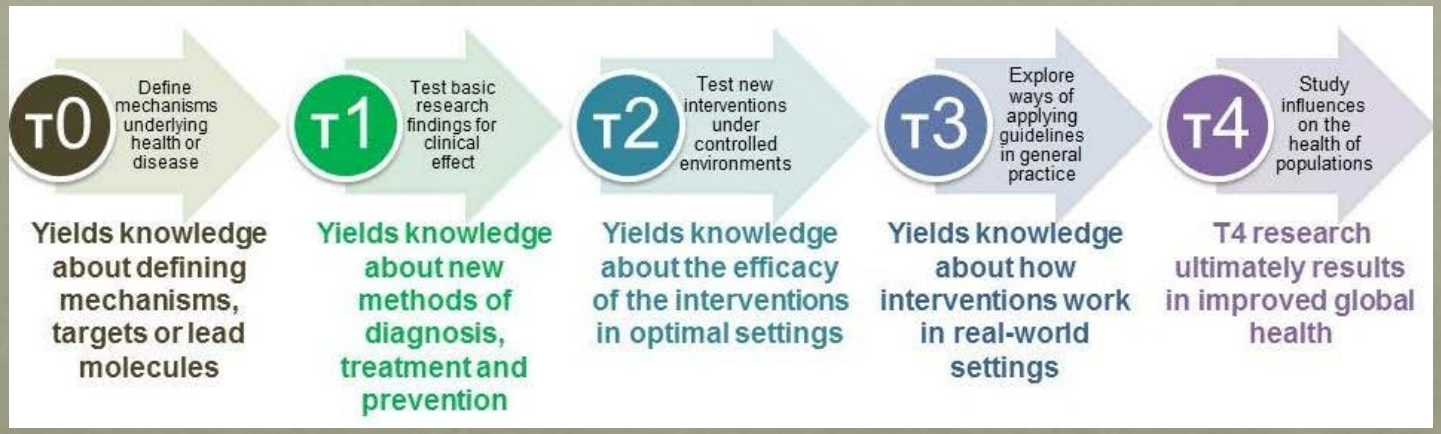
- Two major areas of translation.
  - Process of applying discoveries generated during research in the laboratory, and in preclinical studies, to the development of trials and studies in humans (research focus).
  - Enhancing the **adoption of best practices in the community**, and developing/determining cost-effectiveness of prevention and treatment strategies to **improve global health**.

Rubio DM, Schoenbaum EE, Lee LS, et al. Defining translational research: implications for training. Acad Med. 2010;85:470–5.

National Institutes of Health. Definitions under Subsection 1 (Research Objectives), Section I (Funding Opportunity Description), Part II (Full Text of Announcement), of RFA-RM-07-007: Institutional Clinical and Translational Science Award (U54) Mar2007. [Accessed February 15, 2013.]. http://grants.nih.gov/grants/guide/rfa-files/RFA-RM-07-007.html.

Translational Science





Translational research fosters the multidirectional integration of basic research, patient-oriented research, and population-based research, with the long-term aim of improving the health of the public.

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So… why is translation science important in first aid and first aid education?

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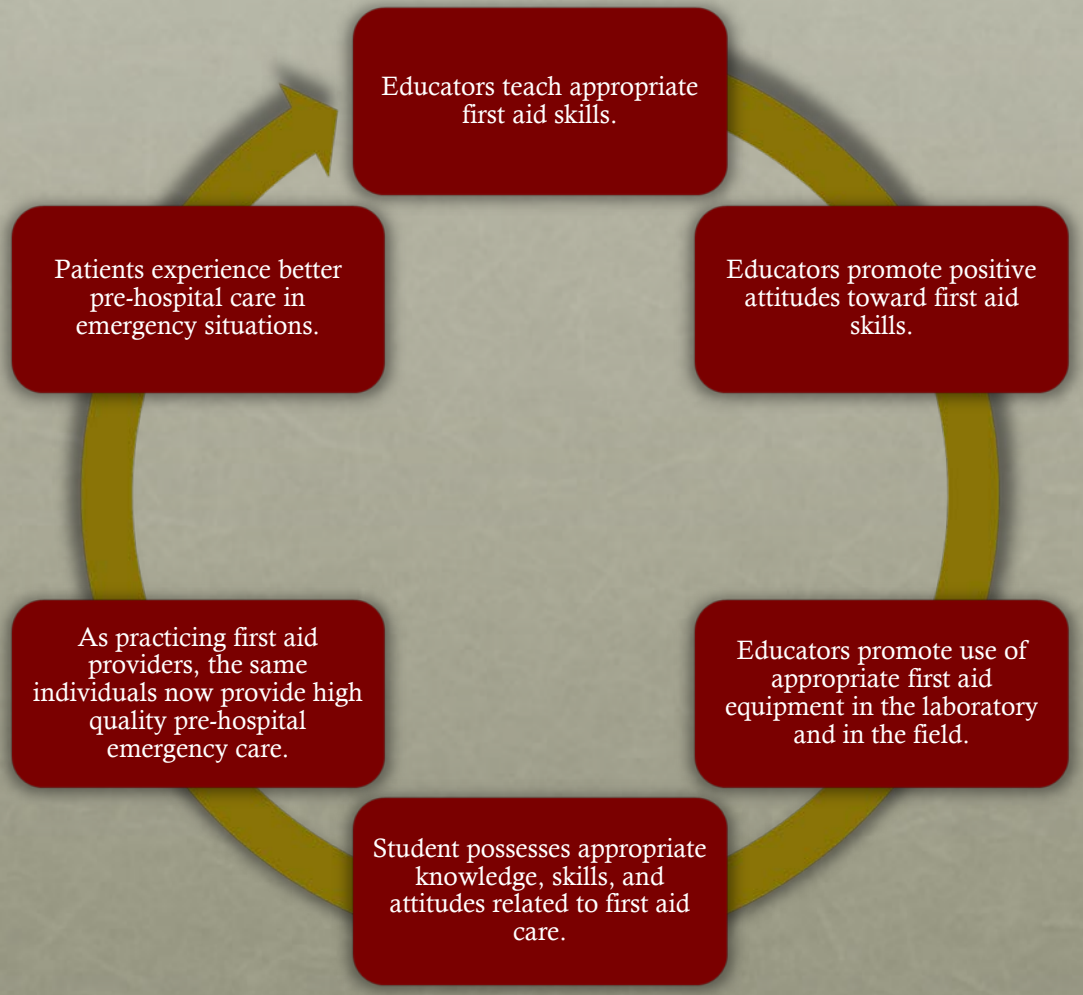
Translational Science to Change Clinical Practice via Education



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So… why is translation science important in first aid and first aid education?

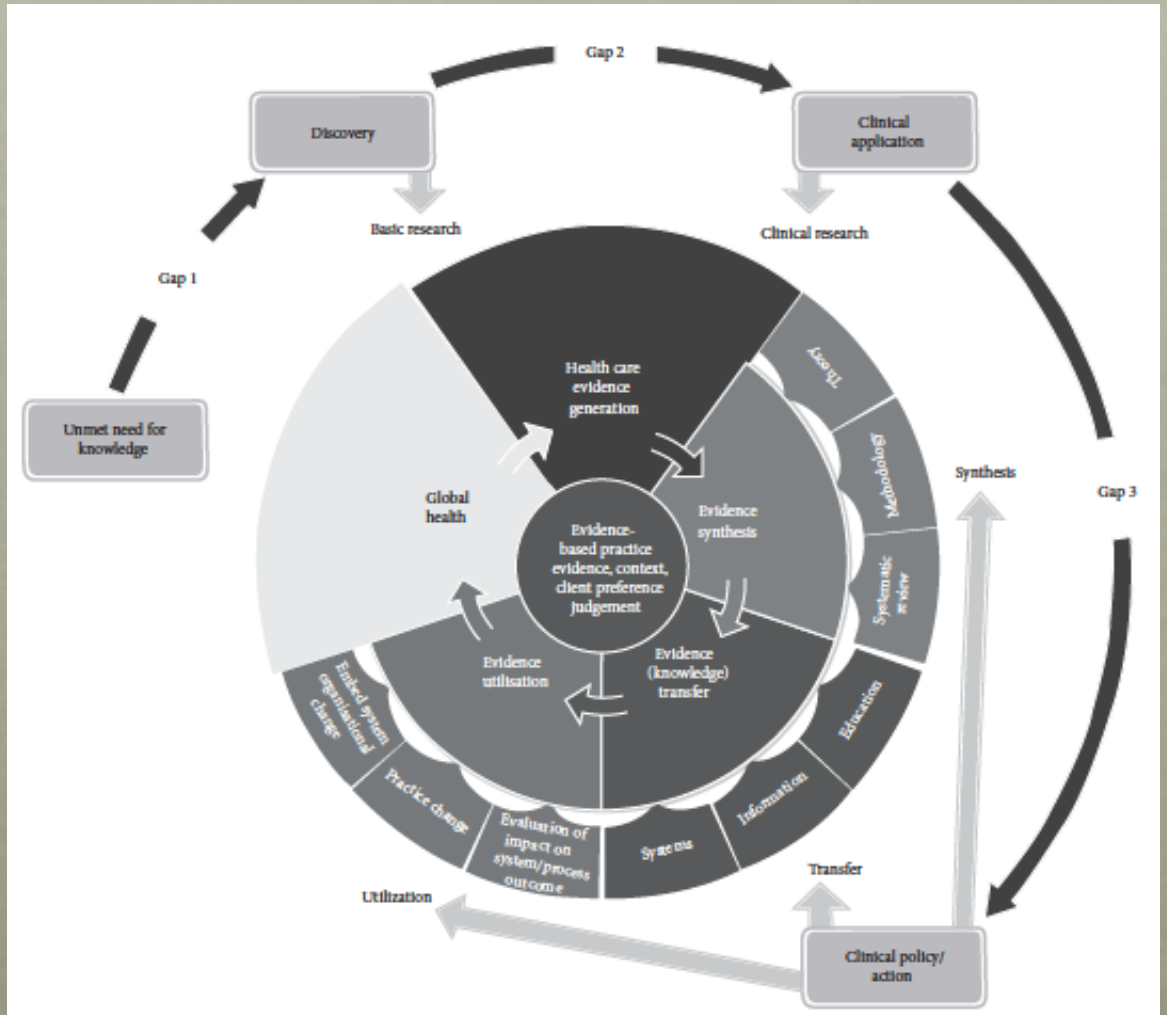

FIGURE 4: The relationship between the translation science cycle and evidence-based healthcare.

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Translational Science

Model of Translational Science in First Aid Education

Research demonstrating an **EFFECT** **(Gold Standard)** on the development of first aid knowledge, skills, ***professionalism***, and ***attitude*** is coined **T1 translational science.**

Translational Science

Model of Translational Science in First Aid Education

T2 translational science occurs when educational outcomes transfer to clinical practice.

This results in more practicing first aiders **adopting best practices and treatment** strategies in the community.

Translational Science

Model of Translational Science in First Aid Education

T3 translational science describes research findings that **improve** patients' health, such as health care outcomes and policies.

Translational Science

Educational Interventions	T1	T2	T3
Increased or Improved	Knowledge, skills, attitudes, and professionalism	Patient care practices	Patient outcomes
Target	Individuals & teams	Individuals & teams	Individuals & public health
Setting	Classroom or teaching laboratory	Clinical site	Clinic and community
Example	Students/inst. develop good skills and attitudes toward *best practices and treatment strategies*	Practicing first aider use *best practices and treatment strategies*	… is recognized, treated, and/or prevented more frequently

Example of Translational Science

Do you have a good example of translation science that applies to first aid and first aid education?

Example of Translational Science

Performance Domain III of Board of Certification (BOC) Role Practice Analysis, 7th Edition outlines the knowledge/skills needed by athletic trainer to provide care in emergent situations, independent of one's practice setting.

Included within this emergent plan of care is the implementation of appropriate techniques and procedures (position statements) designed to provide the patient with optimal outcomes.

Example of Translational Science

T1 translational science

- Example
  - Developing **skills and favorable attitudes** towards measuring rectal temperature and use of cold water immersion as part of evidence-based care of EHS.

T2 translational science

- Example
  - Educational practices leading to **more** providers preparing for and measuring core temperatures when treating EHS and **more** providers being prepared to rapidly cool athletes.

Example of Translational Science

T3 translational science

- This area includes health care delivery and policies that show improvements in the health of individuals/populations.

Example of Translational Science

- However, ***best practices and treatment strategies*** (EBP) are **NOT** always implemented by providers, particularly in emergency care.
  - Example
    - ATs have reported a hesitancy to comply with the practices of rectal thermometers or rapid whole-body cooling when responding to exertional heat illness.

Translational Science

So why doesn't T1 (skills) always manifest itself into T2 (utilization)?

What are the barriers to integrating best practices and treatment strategies, particularly for the treatment of EHS, at any level of providers?

Recognition of EHS

The 2 main diagnostic criteria for EHS are CNS dysfunction and a core body temperature greater than 40.5°C (105°F).[16,19,52] However, if a suspected EHS victim exhibits CNS dysfunction even though the rectal temperature is slightly lower (ie, 40°C [104°F]), it is prudent to assume the patient is suffering from EHS and begin the appropriate treatment. After initial collapse, recognition is often delayed, and the patient may begin to cool passively, dropping below the 40.5°C (105°F) threshold. Rectal temperature thermometry is the only method of obtaining an immediate and accurate measurement of core body temperature. Other devices, such as oral, axillary, aural canal, tympanic, forehead sticker, and temporal artery thermometers, inaccurately assess the body temperature of an exercising person.[38–41] A delay in accurately assessing temperature during diagnosis may also explain a body temperature that is lower than expected. *Strength of recommendation: A*

National Athletic Trainers' Association Position Statement: Exertional Heat Illnesses

Journal of Athletic Training 2015;50(9):986–1000
doi: 10.4085/1062-6050-50.9.07

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Recognition of EHS

7. Rectal temperature and gastrointestinal temperature (if available) are the only methods proven valid for accurate temperature measurement in a patient with EHS. Inferior temperature assessment devices should not be relied on in the absence of a valid device. *Evidence Category: B*

Journal of Athletic Training 2012:47(1):96–118

www.nata.org/jat

position statement

National Athletic Trainers' Association Position Statement: Preventing Sudden Death in Sports

Temperature Assessment Devices Actual Practice

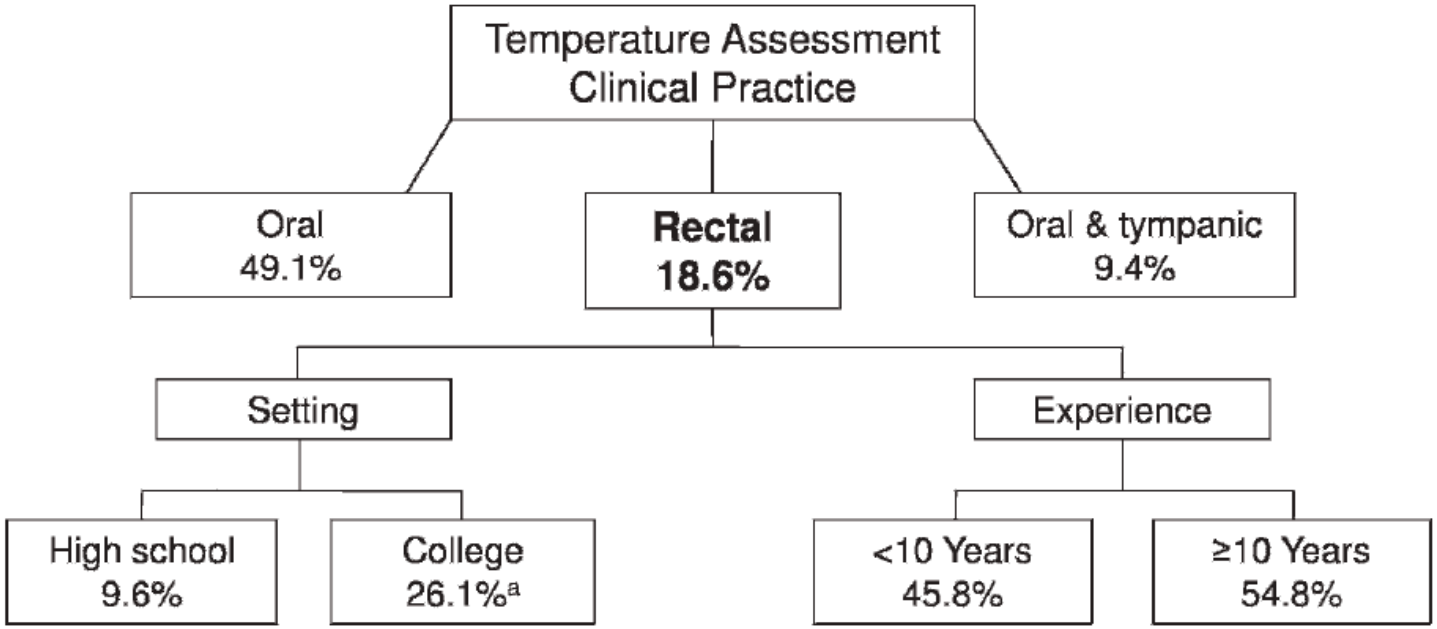

Figure 2. Athletic trainers' temperature assessment clinical practices, overall and within setting and experience groups (high school athletic trainers = 197, collegiate athletic trainers = 249, athletic trainers with fewer than 10 years of experience = 209, athletic trainers with 10 or more years of experience = 236). [a] $P < .05$.

Journal of Athletic Training 2010;45(2):170–180

www.nata.org/jat

original research

Current Knowledge, Attitudes, and Practices of Certified Athletic Trainers Regarding Recognition and Treatment of Exertional Heat Stroke

Barriers to the Use of Rectal Thermometers

Invasiveness

- "Privacy issues on sidelines"
- "Comfort level of athlete"
- "Too invasive and embarrassing to student"
- "Depending on the athlete, it would be personal invasion of their privacy."

Lack of training

- "I have not been trained on how to take rectal temperatures."
- "I have had little practice at performing the task and would doubt my abilities to perform it under pressure."
- "Insufficient instruction"
- "I would not be comfortable taking a rectal temperature."

No equipment

- "We do not have a rectal thermometer."
- "Institution does not own rectal thermometer."
- "Not proper equipment to assess rectal temperature—low budget at my high school"
- "I do not use a thermometer because I understand rectal to be the only accurate measure and I do not have a rectal thermometer."

Barriers to the Use of Rectal Thermometers

Other reasons

- "Regardless of its effectiveness in determining core body temp, I would definitely be charged with sexual harassment/crime at my institution (or any in this area for that matter)."
- "No protocol, no desire"
- "Not practical"
- "I see little benefit from taking rectal temperature. By the time pants/equipment is [sic] removed, it is too time consuming. That time is better spent in the ice bath bringing body temp down. Also it is difficult to monitor rectal temp during the cooling process."
- "Not necessary [to evaluate core body temperature] for heat stroke"
- "Not appropriate at high school level [to utilize rectal temperature]"
- "Oral temperature along with symptoms are accurate enough to determine [severity/condition]."
- "Not in my scope of practice"
- "Organization does not want to put us [athletic trainers] at risk for lawsuits by assessing heat stroke using rectal thermometers."

Treatment of EHS

When EHS is suspected, the patient's body (trunk and extremities) should be quickly immersed in a pool or tub of cold water. Removing excess clothing and equipment will enhance cooling by maximizing the surface area of the skin. However, because removing excess clothing and equipment can be time consuming, CWI should begin immediately and equipment should be removed while the patient is in the tub (or while temperature is being assessed or the tub is being prepared).[59] Rectal temperature and other vital signs should be monitored during cooling every 5 to 10 minutes if a continuous monitoring device is not available.[20,60] Strength of recommendation: B

National Athletic Trainers' Association Position Statement: Exertional Heat Illnesses

Journal of Athletic Training 2015;50(9):986–1000
doi: 10.4085/1062-6050-50.9.07

Treatment of EHS

Cold-water immersion up to the neck is the most effective cooling modality for patients with EHS.[57] The water should be approximately 1.7°C (35°F) to 15°C (59°F) and stirred continuously to maximize cooling. The patient should be removed when core body temperature reaches 38.9°C (102°F) to prevent overcooling (Table 4).[60]

Strength of recommendation: A

National Athletic Trainers' Association Position Statement: Exertional Heat Illnesses

Journal of Athletic Training 2015;50(9):986–1000
doi: 10.4085/1062-6050-50.9.07

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Treatment of EHS

If full-body CWI is not available, partial-body immersion (ie, torso) with a small pool or tub and other modalities, such as wet ice towels rotated and placed over the entire body or cold-water dousing with or without fanning, may be used but are not as effective as CWI.[61,62] *Strength of recommendation: B*

National Athletic Trainers' Association Position Statement: Exertional Heat Illnesses

Journal of Athletic Training 2015;50(9):986–1000
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Cooling Treatment
Clinical Practice

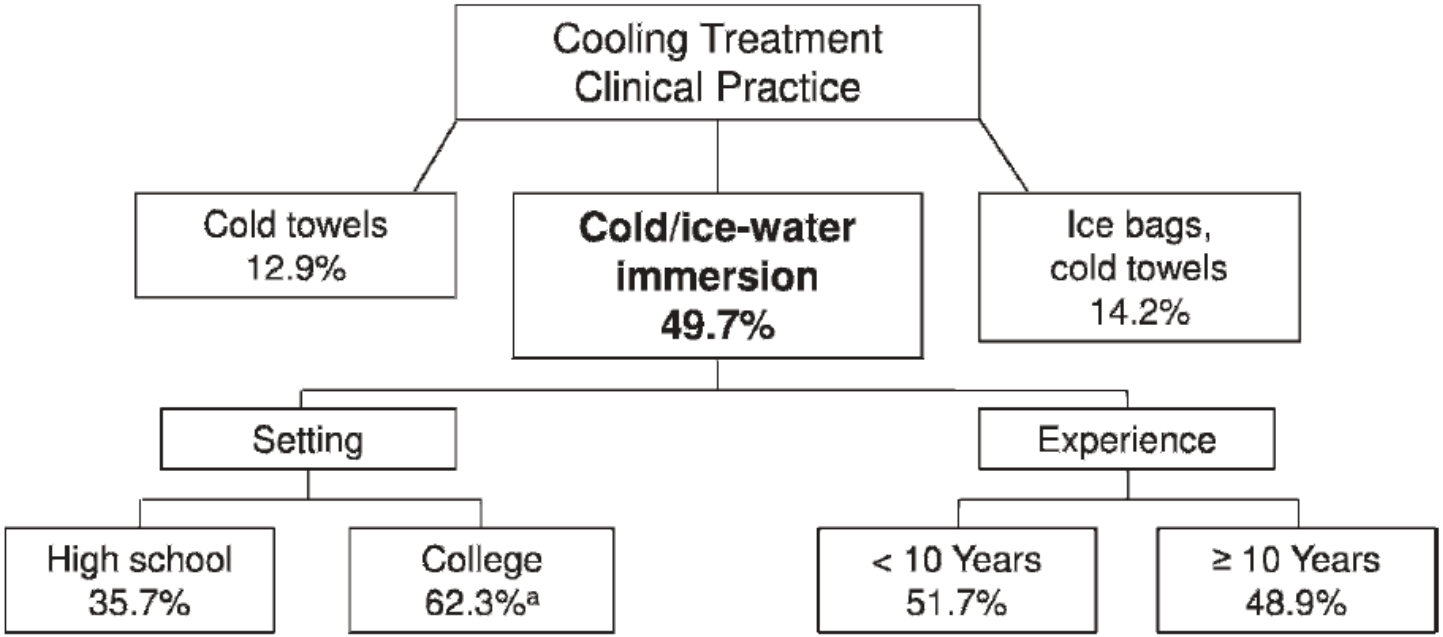

Figure 5. Athletic trainers' cooling treatment clinical practices, overall and within setting and experience groups (athletic trainers with fewer than 10 years of experience = 209, athletic trainers with 10 or more years of experience = 236). [a] $P < .05$.

Journal of Athletic Training 2010;45(2):170–180

www.nata.org/jat

original research

Current Knowledge, Attitudes, and Practices of Certified Athletic Trainers Regarding Recognition and Treatment of Exertional Heat Stroke

Barriers to Implementation of Cold-Water or Ice-Water Immersion

Limited resources

- "Because I do not have the necessary equipment for cold-water immersion, which is why I use a cold shower"
- "Staffing issue"
- "No facilities, extra staff and equipment to perform this procedure"

Location

- "Practice field is not equipped with water supply sufficient for cold-water immersion."
- "Facility not conducive to that treatment"
- "Access to cold-water immersion in an outside/on-field situation"

Shock and safety

- "Maybe too much of a shock to the system"
- "Too difficult to get athlete in bath with limited staff and keep from drowning"
- "Cardio complications"
- "Safety: having to place and remove the individual from the container"
- "Way too risky for shock"
- "Possibility of athlete becoming unconscious while in the water and drowning"
- "Cold-water immersion with severe heat stroke could induce shock due to the rapid change in core temperature. I prefer to refer heat stroke to ERs."
- "Fear of shock and drowning as well as vasoconstriction risk"

Barriers to Implementation of Cold-Water or Ice-Water Immersion

Other methods

"[We] have had success with other treatment measures to prevent reaching 'stroke' levels."

"It is easier and more efficient for us to use spray, cold, and a large fan."

"Easier to use ice towel/ice bags or cool shower [than cold-water immersion]"

Other reasons

"You are supposed to cool the body slowly, not rapidly."

"If they are in fact beyond heat exhaustion into heat stroke, they should be transported rather than spending time cooling in a tub."

"If my patient is in heat stroke, I would have called an ambulance. If they have heat exhaustion, I might use this method. But heat stroke is a medical emergency. I would not want to drag the athlete into the ATR [athletic training room] to get in a tub when the ambulance response time is very quick."

"Cold-water immersion is available and may be used in extreme cases. However, our staff does an excellent job of monitoring athlete[s] to prevent such a need."

"I also would be concerned not to cool the body too rapidly and induce other problems, such as hypothermia, since the thermoregulatory mechanism is not working."

What Can YOU Do?

As **educators and clinicians**, what can you/we do to help better facilitate this transition from a novice to providers and managers of emergent situations?

As **students**, what can we do to help better facilitate this transition from a novice to expert planner and manager of emergent situations?

Questions

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Thank you!!!

For more information- please contact David Berry, PhD, AT, ATC

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References

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