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ORIGINAL RESEARCH

Athletic Trainers' Knowledge Regarding Airway Adjuncts

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Context: Research suggests that knowledge gaps regarding the appropriate use of airway adjuncts exist among various health care practitioners, and that knowledge is especially limited within athletic training.

Objective: To determine the relationship between perceived knowledge (PK) and actual knowledge (AK) of airway adjunct use and the difference in PK after AK assessment.

Design: Knowledge assessment.

Patients or Other Participants: Two thousand athletic trainers received the survey via e-mail; 152 (7.6%) responded.

Intervention(s): The AK assessment included 7 items based on the use and implementation of airway adjuncts based on the National Athletic Trainers' Association educational competencies. Perceived knowledge was measured using a well-established PK questionnaire, which also included 1 item to rate likelihood to pursue continuing education (CE).

Main Outcome Measure(s): Perceived knowledge was compared pre- and posttest. Our demographic variables assessed how often lifesaving skills were used. We used total scores of the AK assessment to measure AK. We employed dependent *t* tests to determine the pre- and posttest differences in PK and likelihood to pursue CE. We used a correlation analysis to determine the relationship between PK and AK. We calculated separate analyses of variance to determine differences in AK between the frequencies of lifesaving skill use.

Results: We identified no significant change ($t_{150} = -0.91$, $P = .37$, 95% confidence interval = –0.17 to 0.06) in likelihood to pursue CE. Greater PK was weakly associated with greater AK ($r = 0.36$, $P < .001$). We found a significant difference ($F_{1,145} = 4.63$, $P = .03$, effect size = 0.031, $1 - \beta = 0.57$) between the frequency of use of lifesaving skills and AK.

Conclusion: We identified a knowledge gap among athletic trainers in the use of airway adjuncts. Although the likelihood to pursue CE score was high, the score did not significantly increase after completing the assessment. Participants who use lifesaving skills more frequently scored higher on the AK assessment, suggesting that the more frequently athletic trainers utilize a skill, the more knowledgeable they are.

Key Words: Actual knowledge, perceived knowledge, knowledge gap, continuing education

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INTRODUCTION

To remain relevant and retain effective patient engagement strategies requires practitioners to assimilate and apply constantly emerging evidence-based information and lifelong learning skills.[1] However, research indicates that knowledge gaps exist among professions and practitioners, which may impact patient outcomes when practitioners fail to recognize changes relevant to their clinical practice. The failure to integrate updated information into professional practice creates a difference between actual and perceived knowledge, which can be dangerous when individuals are unaware they possess a knowledge gap.[2–8] On the other hand, research indicates that patient outcomes improve when practitioners participate in continuing education (CE).[9,10] Therefore, CE sessions may be an effective mechanism to bridge content knowledge gaps and provide more efficacious patient care.

Continuing education in athletic training allows skill development beyond the National Athletic Trainers' Association's (NATA) educational competencies (fifth edition) for entry-level practice.[1] The Professional Education Committee (PEC) is a group of athletic training educators whose job is to review and develop the educational competencies.[11] The PEC utilizes the sixth edition (2011) of the Role Delineation Study/Practical Analysis (RDS/PA) to ensure that the educational competencies include all of the necessary knowledge and skills required for entry-level practice.[12] The Board of Certification exam questions are developed to assess athletic training knowledge within the 5 domains defined by the RDS/PA.[12] Finally, undergraduate athletic training programs' abilities to meet these educational competencies and produce competent entry-level practitioners is assessed through the accreditation process.[12]

The educational competencies, RDS/PA, and state practice acts define the scope of practice in athletic training for entry-level professionals. For students enrolled in current Commission on Accreditation of Athletic Training Education-accredited programs, up-to-date content delivery is innate to the educational process; practitioners, on the other hand, must update intentionally through CE.[13] Changes to established practice guidelines occur when research indicates better patient outcomes using different or modified methods of care.[14] Successful implementation of new information, therefore, requires educating practitioners.[14] As the professional scope of practice expands, new clinical practices are traditionally added to educational program competencies. While this benefits current students, practicing clinicians have no mechanism to determine their knowledge gaps, and if identified, must seek this new information through individual inquiry or CE resources.[1]

The use of airway adjuncts was added to athletic training clinical practice with the release of the fifth edition of the NATA educational competencies and proficiencies in 2011.[1] Although this clinical practice is now a component of the NATA educational competencies, knowledge gaps may exist among previously credentialed athletic trainers. Therefore, the purposes of this study were to:

1. Determine the relationship between perceived and actual knowledge (to measure knowledge gap) and
2. Assess differences in pretest and posttest perceived knowledge

METHODS

This study is a knowledge assessment with 2 aims: (1) to measure the relationship between perceived and actual knowledge (correlational) and (2) to measure a change in perceived knowledge and likelihood to pursue CE after an actual knowledge assessment (pretest/posttest).

Participants

The NATA membership directory was used to randomly select athletic trainers with current certification, while excluding members who had retired or held lapsed memberships. Of these, 2000 potential participants were e-mailed the Perceived Knowledge Questionnaire, the Actual Knowledge Assessment, and 5 demographic questions (gender, years of experience, credentials, job setting, and specified work in an emergent setting using lifesaving skills).

Instrumentation

We used a Perceived Knowledge Questionnaire (PKQ) and an Actual Knowledge Assessment (AKA) as the 2 testing instruments in this study. The PKQ assessed each participant's confidence in using airway adjuncts. The PKQ was modified from Flynn and Goldsmith's[15] 5-item subject knowledge assessment tool. Flynn and Goldsmith[15] completed 5 empirical studies to estimate internal and external consistency of the PKQ, establishing dimensionality, generalizability, test-retest reliability, psychometric properties, content, convergent, criterion, nomological, and construct validity. The validation involved several constructs, which expanded the generalizability and, as such, allowed us to insert airway adjuncts as the primary content evaluated in the PKQ.

The AKA measured each participant's understanding of the use and implementation of airway adjuncts; the content was based specifically on the knowledge and skills outlined in the NATA educational competencies (fifth edition). The AKA was developed by the researchers to determine actual knowledge of airway adjuncts through multiple choice and matching questions. Questions focused on simple memorization or recognition would align with knowledge retrieval items (ie, match the name to the picture). Comprehension items require participants to know the correct instrument given situational cues (maneuver). Utilization items require participants to apply knowledge in scenarios.[16] Prior to this implementation, we pilot tested the AKA using 27 undergraduate students, and determined that 68.7% of the variance

Table 1. Participant Demographics (n = 152)

Characteristic (Number Reporting)	Frequency (%)
Sex (n = 137)	
Male	79 (57.7)
Female	58 (42.3)
Employment setting (n = 152)	
College/university	48 (31.6)
Secondary/intermediate	58 (38.2)
Clinic/hospital	29 (19.1)
Professional	1 (0.7)
Other	16 (10.5)
Years of experience (n = 150)	
<5 y	25 (16.7)
5–10 y	36 (24.0)
>10 y	89 (59.3)
Are lifesaving skill necessary (n = 151)	
Yes	136 (90.1)
No	15 (9.9)
Frequency of life saving skills use (n = 147)	
Not at all	76 (51.7)
Occasionally	71 (48.3)

was assumed within the 3 types of questions: knowledge retrieval, comprehension, and utilization.

Procedure

Participants were e-mailed instructions and the questionnaires via an institutionally secure system and given 3 weeks to complete them. A reminder message was sent 2 weeks after the invitation as well. The survey order included demographic questions (5 items) followed by the pretest PKQ (6 items; 6-point Likert response: *strongly disagree* to *strongly agree*), AKA (3 multiple choice, 6 matching), and posttest PKQ (6 items), respectively. The AKA had a total correct score of 9 points. No feedback was provided following the AKA.[3]

We reverse scored 3 items of the PKQ and calculated a mean score for the first 5 items. We calculated the total number correct from the AKA. These scores were used to perform a correlational analysis between perceived and actual knowledge. We used dependent t tests to determine the pre- and posttest differences in PK and likelihood to pursue continuing education. Levene's statistic (range $P = .052–.530$) suggested heterogeneity, but we violated the assumption of normality (Shapiro-Wilk $P < .001–.097$). As such, we ran both parametric and nonparametric statistics (Kruskal-Wallis tests) to determine if differences in actual knowledge existed between genders, employment settings, years of experience, and frequency of lifesaving skills. The findings of both statistical tests were consistent, but we chose to report the parametric statistical analysis, as this allowed us to perform Scheffe post hoc analyses where appropriate. Significance was set at $P < .05$ a priori.

RESULTS

Since we were unable to accurately determine the number of nondeliverable e-mails from the 2000 sent and exclude them, the response rate was estimated at 7.6% (n = 152). The respondents had an average of 13.84 ± 9.39 years of experience, ranging from 1 to 39 years. Table 1 includes further participant demographic information.

We identified a poor positive relationship ($r = 0.36$, $P < .001$) between pre-PK and AK. We identified no significant change ($t_{151} = 1.17$, $P = .25$, 95% confidence interval [CI] = –0.04 to 0.14) in PK from the pretest (pre = 3.43 ± 1.35) to posttest (post = 3.38 ± 1.30), yet the scores indicated that participants perceived only moderate competence with airway adjunct skills (Tables 2 and 3). Furthermore, participants recognized the need for continuing education prior to testing (pre = 4.35 ± 1.30), and as such, no significant increase ($t_{150} = –0.91$, $P = .37$, 95% CI = –0.17 to 0.06, effect size [ES] = 0.07, $1 - \beta = 0.52$) in likelihood to pursue continuing education after testing existed (post = 4.40 ± 1.35). When stratifying our sample by gender and employment setting, we identified no significant differences in AK (gender: $F_{1,135} = 0.213$, $P = .65$, ES = 0.002, $1 - \beta = 0.074$; employment setting: $F_{1,148} = 0.82$, $P = .49$, ES = 0.016, $1 - \beta = 0.224$). We did, however, recognize significantly higher AK ($F_{1,145} = 4.63$, $P = .03$, ES = 0.031) among participants employing lifesaving skills more frequently (occasionally = 6.5 ± 0.3) than those that do not (not at all = 5.7 ± 0.3; Table 4). We also identified a poor positive relationship ($r = 0.045$, $P = 0.583$) between AK and the likelihood to pursue continuing education. When stratifying the AK scores by years of experience and likelihood to pursue continuing education, we found no significant differences (years of experience: $F_{2,147} = 2.357$, $P = .98$, ES = 0.031, $1 - \beta = 0.471$; continuing education: $F_{2,147} = 0.545$, $P = .581$, ES = 0.007, $1 - \beta = 0.139$). Participants who used lifesaving skills more frequently (occasionally = 4.57) were no more likely to pursue continuing education ($t_{144} = –1.63$, $P = .106$, 95% CI = –0.77 to 0.075, ES = 0.031, $1 - \beta = 0.031$) than the group that did not use lifesaving skills (not at all = 4.22). Of the 47 respondents (30.9%) who held additional credentials, 14 individuals served as emergency medical technician/paramedics (8.21 ± 1.19) and demonstrated significantly higher scores on the AKA (df = 3, $\chi^2 = 24.158$, $P < .001$) than all other groups (performance enhancement = 6.20 ± 1.96; athletic trainers = 5.90 ± 2.39; physical therapists = 5.00 ± 2.28; other = 3.71 ± 0.95).

DISCUSSION

Results indicated a poor positive relationship between perceived and actual knowledge. Our finding is similar to previous research, suggesting weak relationships between perceived and actual knowledge.[2–8] The poor relationship between actual and perceived knowledge, indicating a knowledge gap, can have negative implications for patients. Both clinicians with an inflated sense of and a lack of confidence in perceived knowledge pose risks to patients.[9,10] Overconfidence may lead to the lack of compulsion or desire to gain CE, while a lack of confidence may result in hesitation or selecting a technique the practitioner may be more comfortable with. Our research demonstrates a knowledge gap in airway adjunct use among athletic trainers. The airway adjunct competencies are recent additions to the athletic training scope of practice; thus, practicing clinicians need CE to obtain new knowledge about proper uses. The need for CE may be translated to other emerging skills within the scope of practice. In the medical professions, CE is important for 3

Table 2. Perceived Knowledge Questionnaire Statement (Number Reporting)

	Pretest Frequencies (%)	Posttest Frequencies (%)
I know pretty much about airway adjuncts.	(n = 152)	(n = 152)
Strongly disagree	14 (9.3)	16 (10.5)
Disagree	32 (21.2)	33 (21.7)
Somewhat disagree	26 (17.2)	21 (13.8)
Somewhat agree	29 (19.2)	38 (25.0)
Agree	33 (21.9)	32 (21.1)
Strongly agree	17 (11.2)	12 (7.9)
I do not feel very knowledgeable about airway adjuncts.	(n = 151)[a]	(n = 151)[a]
Strongly disagree	13 (8.6)	17 (11.3)
Disagree	39 (25.8)	33 (21.9)
Somewhat disagree	32 (21.2)	35 (23.2)
Somewhat agree	16 (10.6)	19 (12.6)
Agree	30 (19.9)	31 (20.5)
Strongly agree	21 (13.9)	16 (10.6)
Among my colleagues, I am one of the "experts" on airway adjuncts.	(n = 151)	(n = 151)
Strongly disagree	54 (35.8)	40 (26.5)
Disagree	39 (25.8)	47 (31.1)
Somewhat disagree	17 (11.3)	21 (13.9)
Somewhat agree	16 (10.6)	17 (11.3)
Agree	15 (9.9)	17 (11.3)
Strongly agree	10 (6.6)	9 (6.0)
Compared to most other athletic trainers, I know less about airway adjuncts.	(n = 151)[a]	(n = 152)[a]
Strongly disagree	7 (4.6)	7 (4.6)
Disagree	15 (9.9)	14 (9.2)
Somewhat disagree	25 (16.4)	35 (23.0)
Somewhat agree	50 (32.9)	47 (30.9)
Agree	33 (21.7)	31 (20.4)
Strongly agree	22 (14.5)	18 (11.8)
When it comes to airway adjuncts, I really don't know a lot.	(n = 152)[a]	(n = 152)[a]
Strongly disagree	13 (8.6)	15 (9.9)
Disagree	38 (25.0)	31 (20.4)
Somewhat disagree	29 (19.1)	38 (25.0)
Somewhat agree	20 (13.2)	23 (15.1)
Agree	29 (19.1)	31 (20.4)
Strongly agree	23 (15.1)	14 (9.2)
I am likely to pursue continuing education to improve my knowledge about airway adjuncts.	(n = 152)	(n = 152)
Strongly disagree	5 (3.3)	6 (3.9)
Disagree	8 (5.3)	10 (6.6)
Somewhat disagree	26 (17.2)	20 (13.2)
Somewhat agree	32 (21.2)	31 (20.4)
Agree	50 (33.1)	52 (34.2)
Strongly agree	30 (19.9)	33 (21.7)

[a] Responses were reverse scored.

reasons, patient efficacy, maintaining the integrity of the profession, and establishing a legal standard. Practitioners who fail to incorporate new skills/competencies may diminish patient outcomes and mitigate legal standard of care. Thus, CE is essential to bridge the knowledge gap of clinicians.

We also examined the change in perceived knowledge before and after the AKA and identified no significant change in pretest and posttest perceived knowledge. This result suggests that participants were moderately confident in their perceived knowledge at the onset, and the test did not change that perception. Although participants indicated moderate perceived knowledge of airway adjuncts, the participants still perceived they knew more than reality. The results suggest that practitioners failed to accurately recognize their lack of knowledge, which could potentially harm patients. In previous literature,[3] a similar phenomenon occurred, where the test and/or feedback did not change PK, but led to a greater desire

Table 3. Actual Knowledge Assessment (n = 152)

Question (Number Reporting)	Correct Frequencies (%)
Matching: correctly identify airway adjunct:	
Which airway adjunct is the nasopharyngeal airway adjunct? (n = 150)	127 (84.7)
Which airway adjunct is the supraglottic airway adjunct? (n = 151)	99 (65.6)
Which airway adjunct is the oropharyngeal airway adjunct? (n = 145)	105 (72.4)
Match the airway adjunct to its function:	
Allows air to travel down the trachea and into lungs when oral trauma is present. (n = 149)	115 (77.2)
Creates a seal in the posterior pharynx, obstructing the esophagus, which forces air into the trachea. (n = 150)	100 (66.7)
Used to prevent the tongue from falling back on the posterior pharynx to maintain airway. (n = 150)	112 (74.7)
Select the scenario in which airway maintenance is indicated: (n = 151)	37 (24.5)
Which maneuver is used to help establish an airway in patients with a cervical spine injury? (n = 151)	137 (90.7)
Which airway adjunct device can be used to maintain an airway in a patient with an intact gag reflex? (n = 152)	89 (58.6)

to seek CE (posttest). Both these findings are counter to theory suggesting both internal (the test) and external (summative score) feedback mechanisms should change PK.[3] Regardless, PK did not change after the AKA, suggesting an inflated confidence which will likely lead to an athletic trainer improperly applying the skill.

Based on the literature, emergent care skills should be taught using a scenario-based approach.[17,18] Individuals should review knowledge and skills every 6–12 months to prevent degradation over time.[17–23] Athletic trainers and other health care professionals need to be aware of the decreases of knowledge and skills over time and proactively seek CE. The NATA's position statement on emergency action plans suggests reviewing and rehearsing emergency procedures at least once per year.[24] Our results support the ideal that practitioners who use these skills more frequently have a higher AK. Emergency medical technician/paramedics scored significantly higher than any other group of participants, suggesting that individuals who use these skills more frequently retain knowledge and skills more than those who do not. Our results also indicate a knowledge gap among athletic trainers in the use of airway adjuncts. Continuing education is needed to decrease the knowledge gap and to ensure that athletic trainers are meeting the standard of care.

A limitation to this study was the small sample size. Previous research[25] found a 20.5% response rate when examining Web-based responses. Walsh et al[26] concluded participants self-selected surveys based on topics of which they had knowledge and opinions. These findings suggest that the participants we recruited had little knowledge of airway adjuncts and may

Table 4. Actual Knowledge Assessment Correct Responses by Frequency of Use of Lifesaving Skills (n = 152)

	How Frequent are Lifesaving Skills Necessary in Your Job?	
Question (Number Reporting)	Not at all	Occasionally
Matching: correctly identify airway adjunct:		
Which airway adjunct is the nasopharyngeal airway adjunct? (n = 124)	60 (48.4)	64 (51.6)
Which airway adjunct is the supraglottic airway adjunct? (n = 97)	47 (48.5)	50 (51.5)
Which airway adjunct is the oropharyngeal airway adjunct? (n = 101)	48 (47.5)	53 (52.5)
Match the airway adjunct to its function:		
Allows air to travel down the trachea and into lungs when oral trauma is present. (n = 113)	59 (52.2)	54 (47.8)
Creates a seal in the posterior pharynx, obstructing the esophagus, which forces air into the trachea. (n = 99)	49 (49.5)	50 (50.5)
Used to prevent the tongue from falling back on the posterior pharynx to maintain airway. (n = 109)	51 (46.8)	58 (53.2)
Select the scenario in which airway maintenance is indicated: (n = 34)	17 (50.0)	17 (50.0)
Which maneuver is used to help establish an airway in patients with a cervical spine injury? (n = 132)	67 (50.8)	65 (49.2)
Which airway adjunct device can be used to maintain an airway in a patient with an intact gag reflex? (n = 87)	37 (42.5)	50 (57.5)

have self-selected not to take the survey. Future research should include an educational opportunity after the survey to determine how many athletic trainers actually pursue CE after they selected that it was necessary. Continuing education courses should include a knowledge and skill assessment to determine if the clinician is proficient in the airway adjunct competencies. Since airway adjuncts are an emergent care skill, we suggest CE should focus on skills practice.

CONCLUSIONS

Findings from the current study indicate that a difference in perceived and actual knowledge of airway adjunct use by athletic trainers exists, which suggests that more vigilant use of CE is necessary by athletic trainers. Likewise, athletic trainers recognize a relative lack of knowledge but were not accurate as to the extent of knowledge regardless of testing. Athletic trainers were likely to pursue CE to decrease their knowledge gap. We found a significant difference between actual knowledge and the frequency of use of lifesaving skills, suggesting that individuals that use the skills more regularly are more knowledgeable, implying that more frequent practice may be needed to retain skill competency. Our findings suggest that athletic trainers are aware of the knowledge gap of the proper applications of airway adjuncts and are likely to pursue CE to decrease the gap. Thus, we suggest CE opportunities are necessary to aid practitioners with newer and emerging competencies to ensure that athletic trainers are meeting the standard of care for the profession.

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