

# Athletic Trainers' Knowledge Regarding Health Care Delivery Systems and Administration in the American Health Care System

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**Context:** The American health care system is dynamic and ever evolving. As athletic training continues to advance, our understanding of and the ability to integrate best practices in policy construction and implementation, documentation, and basic business practices is critical to promoting optimal patient care.

**Objective:** To identify and compare knowledge gaps of clinicians and educators regarding health care delivery systems and administration.

**Design and Setting:** Cross-sectional, Web-based survey.

**Patients or Other Participants:** Athletic trainers (N = 485), representative of the national demographic of the profession (age = 37 ± 12 years, experience = 14 ± 11 years).

**Intervention(s):** We used a multi-part assessment including a perceived knowledge questionnaire, validated knowledge assessment (21 items: knowledge retrieval [11 items], knowledge utilization [10 items]), and self-efficacy scales.

**Main Outcome Measure(s):** We calculated the knowledge assessment total score and compared educators (n = 41) and clinicians (n = 444). We calculated the knowledge gap with a Spearman  $\rho$  correlation to determine the relationship between perceived knowledge mean and the knowledge retrieval subscore. We calculated the practice gap with a Spearman  $\rho$  correlation to determine the relationship between self-efficacy mean and the knowledge utilization subscore.

**Results:** Athletic trainers scored less than 50% on a knowledge assessment (mean = 10.27 ± 2.41 of 21) about health care delivery systems and administration. We identified that educators scored approximately 1 point higher (11.65 ± 0.4) than clinicians (10.14 ± 0.11), equivalent to 7% to 10% higher on the knowledge assessment. We identified, relative to health care delivery systems and administration, a knowledge gap (Spearman  $\rho$  = .161,  $P$  < .001) between perceived knowledge and knowledge retrieval and a practice gap (Spearman  $\rho$  = .095,  $P$  = .037) between self-efficacy and knowledge utilization.

**Conclusions:** Athletic trainers demonstrated knowledge and practice gaps related to health care delivery systems and administration. To meet the expectations of the practice analysis and the needs of patients in today's American health care system, we must engage in professional development in this domain of practice.

**Key Words:** Self-efficacy, continuing education, health care executives

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## KEY POINTS

- Athletic trainers do not demonstrate sufficient knowledge regarding health care delivery systems and health care administration concepts. Although educators scored higher on the knowledge assessment, performance is still poor relative to the concepts deemed important to athletic training practice by experts in the field.
- Previous research has indicated that athletic trainers have little interest in developing themselves professionally in Domain V. This lack of interest may lead to eventual knowledge and practice gaps, as evidenced by our findings.
- The insufficient knowledge demonstrated by clinicians and educators could have a detrimental effect on future generations of athletic trainers. Professional development, curricula, and mentorship that aims to maximize the knowledge skills, as well as abilities in health care delivery systems and administrative concepts, are critical to resolving these issues in our profession.

## INTRODUCTION

The American health care delivery system has evolved significantly over the last several decades due to government regulations, patient expectations, and advances in technology. Specifically over the past decade, there has been a rapid change in the delivery system due to an increase in the access to health care professionals, an increased cost of medical services, and the expansion of the quality improvement process to Lean Methodology improves efficiency.<sup>1</sup> One evident change in the health care system was the Patient Protection and Affordable Care Act, a federal statute commonly referred to as the Affordable Care Act, that was signed into law by President Barack Obama in 2010 and created the nation's largest expansion of health coverage and largest governmental shift since 1965 when Medicare and Medicaid were enacted.<sup>2,3</sup> The expansion of health coverage is rooted in patient advantages such as preventative and wellness services, both also linked to concerns such as provider availability for the increased number of patients in the health care system, changes in the period and process for insurance enrollment and coverage, and the provider's ability to maintain competence navigating the health care network.

As health care continues to grow and change to match the current market, the delivery system has transitioned to allow patients and providers to interact more freely. Athletic trainers play an integral role in increasing access to health care and, as such, must be up-to-date with the current American health care delivery system and administrative infrastructure necessary to improve the patient experience while decreasing costs and waste. Unfortunately, early-career athletic trainers have cited health care administration skills as a personal deficiency,<sup>4</sup> and employers have suggested that new graduates have deficits in understanding health care infra-

structure and administration.<sup>5</sup> Moreover, health care administration and professional responsibility are not areas of interest when athletic trainers are planning for continuing education and professional development.<sup>6</sup> Thus, it is possible that athletic trainers are developing knowledge and practice gaps relative to health care delivery systems and administration.

Put simply, health care has changed in the last decade and athletic training educational expectations are on the cusp of their own evolution. To ensure that learners are in an ideal position to meet the needs of patients within the triple aim,<sup>7</sup> their educators must be equipped to teach these concepts. Our purpose was to evaluate the self-efficacy as well as perceived and actual knowledge of athletic trainers and educators relative to health care delivery systems and administration. To focus our purpose, we used a panel of experts to identify entry-level knowledge expectations that align with the 2020 Standards for Accreditation of Professional Athletic Training Programs and the associated Board of Certification Practice Analysis (seventh edition; Standards 64 through 67, 88 through 94; Domain 5, Tasks 0501 through 0504).<sup>8,9</sup>

## METHODS

We used a cross-sectional design to evaluate athletic trainer knowledge (perceived and actual) and self-efficacy relative to health care delivery systems and administration in the American health care system. The Indiana State University Institutional Review Board approved this study.

## Participants

We sent e-mails to a random sample of athletic trainers ( $N = 8043$ ) who had indicated a willingness to participate in research through the National Athletic Trainers' Association (NATA) database. From this sample, 937 athletic trainers accessed the survey (access rate = 11.6%) with partial response to the survey from 851 athletic trainers. A total of 485 athletic trainers completed the entire assessment and were included in data analysis (response rate = 6.0%). Participants were representative of the national demographics<sup>10</sup> in the profession (age =  $37 \pm 12$  years; years of experience =  $14 \pm 11$  years; Table 1). Overwhelmingly, the majority of our participants possessed their National Provider Identifier ( $n = 431$ , 88.9%).

## Instruments

We used a multi-part instrument to answer our research questions: demographics (5 items), perceived knowledge questionnaire (1 matrix question with 5 prompts), knowledge assessment (21 items: knowledge retrieval [11 items], knowledge utilization [10 items]), and a self-efficacy scale (10 items).

**Perceived Knowledge Questionnaire.** The perceived knowledge questionnaire has been used in previous knowledge

**Table 1. Demographics of Participants**

Characteristic	Frequency, n (%)
Education	
Bachelor's	124 (25.6)
Master's	294 (60.4)
Academic doctorate	45 (9.3)
Clinical doctorate	25 (5.2)
Job setting	
Secondary schools	138 (28.5)
College/university	133 (27.4)
Clinic and outreach	44 (9.1)
Education/academia/research	41 (8.5)
Clinic	29 (6.0)
Occupational health/industrial	14 (2.9)
Hospital	12 (2.5)
Independent contractor	10 (2.1)
Business/sales/marketing	9 (1.9)
Performing arts	7 (1.4)
Amateur/recreational/youth sports	6 (1.2)
Health/fitness/sports performance clinic/clubs	5 (1.0)
Military/law enforcement/government	5 (1.0)
Unemployed	5 (1.0)
Other	27 (5.6)

gap studies in athletic training<sup>11–13</sup> and was first established by Flynn and Goldsmith.<sup>14</sup> The 5-item perceived knowledge assessment tool was evaluated through 5 empirical studies to estimate internal and external consistency and establish dimensionality, generalizability, and test-retest reliability.<sup>14</sup> In addition, the authors confirmed content, convergent, criterion, nomological, and construct validity. Specifically, the tool was evaluated with several constructs, which made it generalizable, allowing us to insert the “administrative concepts in health care delivery systems.” To confirm within our population, we determined strong internal consistency among our participants (Cronbach  $\alpha = 0.870$ ).

**Knowledge Assessment.** We established content and face validity using a Delphi panel ( $n = 7$ ). A Delphi panel uses multiple rounds of review to establish consensus. To begin the process of establishing consensus, we identified relevant literature and regulatory documents to guide our first round. We reviewed the 2020 Standards for Accreditation of Professional Athletic Training Programs and the associated Board of Certification Practice Analysis (seventh edition) tasks relative to health care delivery systems and administrative concepts (Standards 64 through 67, 88 through 94; Domain 5, Tasks 0501 through 0504).<sup>8,9</sup> In the first round of review, we sent the panelists a survey to detail their years of experience ( $18 \pm 7$  years) and contemporary qualifications to serve as a panelist (Table 2). We then asked the Delphi panel to read each standard closely and determine what concepts within that standard should be considered for inclusion in the knowledge assessment. From this round, we created a list of potential concepts for inclusion (Table 3) that explored health care delivery systems and administration with respect to knowledge retrieval and knowledge utilization style prompts. For Round 2, we sent the list to the Delphi panel in an e-mail and asked for feedback relative to significant concepts that panelists believed had been left out or whether a concept was

insignificant and should be deleted. On the basis of the feedback in Round 2, we developed a 21-item knowledge assessment.

At this point in the review process one of the panelists discontinued participating in instrument development. In Round 3, we presented the panelists with each item, a reference to provide evidence to support the correct response. We asked the panelists to indicate whether they believed the question and responses were adequate as written, the question was adequate as written, the responses were adequate as written, or the question should be removed from the knowledge assessment. If the panelists indicated that the responses or the question needed revision, we asked for suggested modifications. If the panelists believed that the question should be removed, we asked for a rationale. At the end of Round 3, we had achieved consensus on 11 items. In Round 4, we used the same platform as Round 3, presenting the question and reference and asking about necessary modifications and rationale. We highlighted changes to the remaining 10 items to draw attention to the modifications from Round 3 to Round 4. At the end of this survey, we asked the panelists to rate their level of agreement that the assessment reflects a wide range of health care delivery system concepts, enough so that it could be defined as a comprehensive knowledge assessment. We asked panelists to note that both clauses of the aforementioned statement must be true for them to agree. We also asked them to rate their level of agreement that the tool (all items and responses) was sufficient as written to measure actual knowledge of athletic trainers regarding health care delivery system concepts. At the conclusion of Round 4, we achieved consensus on all questions and responses, 83% ( $n = 5/6$ ) agreement that the tool was wide-ranging and comprehensive, and 100% ( $n = 6/6$ ) agreement that tool was sufficient as written.

**Self-Efficacy Scale.** The self-efficacy scale was developed to assess individuals' belief in their own abilities.<sup>15</sup> Similar items have been used in athletic training research relative to the ability to assess for a concussion, apply specific tests and measures for concussion assessment, and return someone to play after a concussion.<sup>16</sup> We used the scale similarly, interchanging the construct in the scale relative to the construct in a corresponding knowledge utilization question. For instance, relative to item 14, the participants ranked their confidence relative to “applying principles of patient privacy” and then were asked in the knowledge utilization question to appropriately apply laws relative to compliant communication for a patient case (Figure). We used an 11-point Likert scale prescribed by Bandura<sup>15</sup> beginning with 0, which was equivalent to *cannot do at all*, and progressing at 10-point increments to 100, which meant *highly certain can do*. At the halfway mark 50, another descriptor indicated *moderately can do*. The self-efficacy scale demonstrated strong internal consistency (Cronbach  $\alpha = 0.733$ ).

## Procedures

We sent a recruitment e-mail to a random sample of athletic trainers March 5, 2019, at 8 AM Eastern Standard Time (EST) and weekly follow-up reminders every week for 5 weeks at either 8 AM or 11 AM EST. We closed the link to participate 6 weeks after the initial e-mail. When participants clicked on the link to participate, they indicated consent by selecting “Yes, I

**Table 2. Panelist Qualifications**

Panelist	Years of Experience	Contemporary Qualifications as a Content Authority in Health Care Administration	Work Area(s)	Patient Care Setting
A	22	<ul style="list-style-type: none"> <li>• PhD in human services with a specialization in health care administration</li> </ul>	<ul style="list-style-type: none"> <li>• Education</li> <li>• Patient care</li> <li>• Personnel management</li> <li>• Health care administration</li> </ul>	<ul style="list-style-type: none"> <li>• College/university athletics</li> <li>• General medical, free health care clinic</li> <li>• Outpatient rehabilitation clinic</li> </ul>
B	8	<ul style="list-style-type: none"> <li>• Worked health care administration for 4 years</li> <li>• Serve as director of athletic training services for a health care system.</li> <li>• Previous health systems manager of athletic training</li> </ul>	<ul style="list-style-type: none"> <li>• Education</li> <li>• Patient care</li> <li>• Personnel management</li> <li>• Health care administration</li> </ul>	
C	19	<ul style="list-style-type: none"> <li>• Athletic training residency program director using the medical model for health care delivery</li> <li>• Program manager—oversees 26 direct reports and assists with providing traditional high school and collegiate athletic training services</li> <li>• Clinical instructor for 15 years</li> </ul>	<ul style="list-style-type: none"> <li>• Education</li> <li>• Patient care</li> <li>• Personnel management</li> <li>• Health care administration</li> </ul>	<ul style="list-style-type: none"> <li>• Physician practice</li> </ul>
D	6	<ul style="list-style-type: none"> <li>• Master's degree in athletic training with a concentration in industrial athletic training</li> <li>• Management experience in the industrial athletic training setting</li> <li>• Certifications as a medical management and safety specialist and certified ergonomic assessment specialist</li> </ul>	<ul style="list-style-type: none"> <li>• Patient care</li> <li>• Personnel management</li> </ul>	<ul style="list-style-type: none"> <li>• Industrial/occupational</li> </ul>
E	23	<ul style="list-style-type: none"> <li>• Instructed courses in athletic training organization and administration</li> </ul>	<ul style="list-style-type: none"> <li>• Education</li> </ul>	<ul style="list-style-type: none"> <li>• NA</li> </ul>
F	24	<ul style="list-style-type: none"> <li>• Manager of sports medicine for a large health care organization</li> </ul>	<ul style="list-style-type: none"> <li>• Education</li> <li>• Patient care</li> <li>• Personnel management</li> <li>• Health care administration</li> </ul>	<ul style="list-style-type: none"> <li>• Per diem athletic training services in secondary schools</li> </ul>
G	21	<ul style="list-style-type: none"> <li>• 15 years of health care management experience</li> <li>• Published author on health care delivery</li> <li>• Invited speaker and consultant on health care delivery models</li> </ul>	<ul style="list-style-type: none"> <li>• Education</li> <li>• Patient care</li> <li>• Health care administration</li> </ul>	<ul style="list-style-type: none"> <li>• Physician practice</li> </ul>

agree to participate” and then completed the demographics portion of the instrument. The participants then completed the brief perceived knowledge questionnaire and began the knowledge assessment. The first 11 items were relative to knowledge retrieval and were presented to the participant on separate pages (screens). In the next subsection, the participant was first presented with a self-efficacy question relative to the construct addressed in the subsequent knowledge utilization item (Figure).

### Data Analysis

We reverse scored the perceived knowledge questionnaire items and calculated mean perceived knowledge and self-efficacy scores. Then, we calculated a sum of all correct responses in the knowledge assessment (total score). Similar to previous

measures of knowledge gaps,<sup>11–13,17</sup> we used a Spearman  $\rho$  correlation to identify the relationships between the knowledge retrieval subscore and perceived knowledge and the knowledge utilization subscore and self-efficacy. We then compared educators ( $n = 41$ ) and clinicians ( $n = 444$ ) on the knowledge assessment total score using a Mann-Whitney  $U$  test to account for the unequal sample sizes. All data analyses were completed using SPSS (version 25; IBM Corp, Armonk, NY) with the level of significance set at  $P < .05$  a priori.

### RESULTS

We identified a significant but poor relationship between perceived knowledge (mean =  $3.62 \pm 0.98$ ) and the knowledge retrieval subscore (mean =  $4.65 \pm 1.53$ ; Spearman  $\rho = .161$ ,  $P < .001$ ). We also identified a significant and poor relationship



**Table 3. Included Concepts in the Study**

Knowledge Retrieval	Knowledge Utilization
Differences in QI and QA <sup>a</sup>	Systems-based Health Care <sup>a</sup>
• Knowledge assessment question 1	• Knowledge assessment question 12
Documentation methods <sup>a</sup>	QI implementation <sup>a</sup>
• Knowledge assessment question 2	• Knowledge assessment question 13
Coding <sup>b</sup>	HIPAA-compliant electronic communication <sup>a</sup>
• Knowledge assessment question 3	• Knowledge assessment question 14
Maintaining competence <sup>b</sup>	Mental health, HIPAA, and confidentiality <sup>b</sup>
• Knowledge assessment question 4	• Knowledge assessment question 15
Strategic planning <sup>b</sup>	CMS–Billing for care <sup>b</sup>
• Knowledge assessment question 5	• Knowledge assessment question 16
Value-based care <sup>a</sup>	Performance evaluation of physician <sup>b</sup>
• Knowledge assessment question 6	• Knowledge assessment question 17
Patient satisfaction <sup>b</sup>	BOC facility principles <sup>a</sup>
• Knowledge assessment question 7	• Knowledge assessment question 18
Standing orders and privileging <sup>b</sup>	Chart auditing <sup>b</sup>
• Knowledge assessment question 8	• Knowledge assessment question 19
Regulating medications <sup>b</sup>	Data-driven decision-making <sup>a</sup>
• Knowledge assessment question 9	• Knowledge assessment question 20
Goal setting <sup>b</sup>	Policy evaluation and approval <sup>b</sup>
• Knowledge assessment question 10	• Knowledge assessment question 21
Six domains of health care quality <sup>a</sup>	
• Knowledge assessment question 11	

Abbreviations: BOC, Board of Certification; CMS, Centers for Medicare and Medicaid Services; QA, quality assurance; QI, quality improvement.

<sup>a</sup> Health care delivery systems.

<sup>b</sup> Health care administration.

between self-efficacy (mean =  $61.75 \pm 17.50$ ) and the knowledge utilization subscore (mean =  $5.57 \pm 1.46$ ; Spearman  $\rho = .095$ ,  $P = .037$ ). In addition, we examined the difference in actual knowledge between educators and clinicians. We found a significant difference between groups (Mann-Whitney  $U = 6095.5$ ,  $z = -3.53$ ,  $P < .001$ ). On average,

educators scored approximately 1 point higher (mean =  $11.65 \pm 0.4$ ) than clinicians (mean =  $10.14 \pm 0.11$ ), which is equivalent to approximately 7% to 10% higher on the actual knowledge assessment. Perceived knowledge, knowledge recall, knowledge utilization, and self-efficacy scores for clinicians and educators can be found in Table 4.

**Figure. Example of a self-efficacy and knowledge utilization item.**

**Rate your degree of confidence by recording a number from 0 to 100 using the scale below: I am capable of applying principles of patient privacy.**

0	10	20	30	40	50	60	70	80	90	100
Cannot do at all					Moderately can do					Highly certain can do

**You are working with a patient who has been referred to an orthopedic specialist for a potential SLAP lesion. Which of the following communication methods is HIPAA and HITECH compliant?**

A: You receive a social media message stating: “#32 is a go for surgery next week; be hopeful when you break the bad news”

B: You receive a notification within the electronic medical record for this patient confirming the diagnosis and requesting you to schedule a telemedicine appointment to tell the patient

C: You receive an email confirming the diagnosis and requesting a telemedicine appointment with the physician to tell the patient

D: You receive two text messages, one with the MRI image confirming the SLAP lesion and another with the patient’s insurance account number to bill for the MRI

E: You receive a fax message with the patient’s student ID number, telephone number, and diagnosis

F: Two or more of these communication methods are HIPAA and HITECH compliant

**Table 4. Perceived Knowledge, Actual Knowledge, and Self-Efficacy Scores**

Assessment	Mean $\pm$ SD	Clinician, Mean $\pm$ SD	Educator, Mean $\pm$ SD
Perceived knowledge (1–5 scale)	3.62 $\pm$ 0.98	3.62 $\pm$ 0.97	3.64 $\pm$ 1.02
Actual knowledge (out of 21)	10.27 $\pm$ 2.41	10.14 $\pm$ 2.35	11.66 $\pm$ 2.57
Knowledge retrieval (out of 10)	4.70 $\pm$ 1.58	4.65 $\pm$ 1.53	5.24 $\pm$ 1.95
Knowledge utilization (out of 11)	5.57 $\pm$ 1.46	5.49 $\pm$ 1.45	6.41 $\pm$ 1.38
Self-efficacy (0–100 scale)	61.75 $\pm$ 17.30	61.28 $\pm$ 17.39	66.34 $\pm$ 15.80

### Health Care Delivery Systems

Overall, our participants scored poorly on concepts related to health care delivery systems (mean = 3.76  $\pm$  1.46 out of 9). Health care delivery systems questions focused on concepts such as the differences between quality improvement and quality assurance (Table 5, Question 1; 69.3% correct), documentation methods (Table 5, Question 2; 56.9% correct), value-based care (Table 5, Question 6; 23.5% correct), the Institutes of Medicine's Six Domains of Health Care Quality (Table 5, Question 11; 21.9% correct), systems-based health care (Table 5, Question 12; 32.6% correct), quality improvement implementation (Table 5, Question 13; 13.8% correct), HIPAA-compliant electronic communication (Table 5, Question 14; 62.7% correct), Board of Certification facility principles (Table 5, Question 18; 23.3% correct), and data-driven decision-making (Table 5, Question 20; 72.2% correct). The actual knowledge assessment, including the correct answer and the percentage of participants who answered each question correctly, can be found in Table 5.

### Health Care Administration

Participants' scores related to health care administration were generally higher than those related to health care delivery systems; however, the scores were still generally poor (mean = 6.51  $\pm$  1.63 out of 12). Health care administration questions focused on concepts related to coding (Table 5, Question 3; 62.1% correct), maintaining competence (Table 5, Question 4; 23.9% correct), strategic planning (Table 5, Question 5; 5.6% correct), patient satisfaction (Table 5, Question 7; 42.3% correct), standing orders and privileging (Table 5, Question 8; 16.1% correct), regulating medications (Table 5, Question 9; 70.1% correct), goal setting (Table 5, Question 10; 78.6% correct), mental health, HIPAA, and confidentiality (Table 5, Question 15; 67.6% correct), billing for service under Medicaid and Medicare (Table 5, Question 16; 56.9% correct), performance evaluation of physician (Table 5, Question 17; 94.8% correct), chart auditing (Table 5, Question 19; 92.8% correct), and policy evaluation and approval (Table 5, Question 21; 40.2% correct).

### DISCUSSION

The American health care system is one of the most costly in the world, accounting for 17.9% (\$3.5 trillion) of the nation's gross domestic product in 2017, a total that accounts for more than \$10 000 per person per year.<sup>18</sup> The overall total is estimated to increase 5.5% per year and could reach \$6 trillion by the year 2027.<sup>18</sup> Moreover, in 2017, both Medicare and Medicaid spending totals rose to 4.2% and 2.9%, respectively, for a combined total of 37% of all of the health spending in the United States.<sup>18</sup> One potential reason for the increased costs could be the passing of the Affordable Care

Act, which enabled more than 20 million people<sup>19</sup> to have access to health care who did not have had access under previous regulations.<sup>20</sup> As the population continues to age and live longer, access to qualified health care providers may be limited, placing additional demands on the economy and increasing the need for specialized medical services.<sup>7</sup> Previous researchers<sup>21</sup> have identified that athletic trainers could be used to help mitigate the growing shortage of health care providers in the primary care settings, which has been expected to worsen under the Affordable Care Act. An athletic trainer on staff in a primary care setting has been shown to improve the patient experience, system productivity, and cost.<sup>21</sup> Furthermore, athletic trainers serve as specialized allied health care providers and could expand medical services to meet the growing needs of physically active individuals in the general population. To better help and prepare athletic trainers for treating physically active people, an expanding number of professional position, consensus, and official statements that address posttraumatic osteoarthritis,<sup>22</sup> exertional heat illnesses,<sup>23</sup> fluid replacement,<sup>24</sup> and managing acute skin traumas<sup>25</sup> have been created. The need for athletic trainers to integrate into the larger American health care system, regardless of setting, seems obvious, as does the value of having an athletic trainer, but in view of our findings, we suggest that athletic trainers may be ill equipped to deliver health care within the American system. This requires reflection on the role of professional preparation so as to better help learners contextualize patient care skills into the administrative infrastructure needed to deliver the care.

Previous literature in athletic training has demonstrated that knowledge gaps exist in practicing clinicians for several health care-related competencies.<sup>11–13,17</sup> The participants within our study also demonstrated knowledge gaps, given that their perceptions of their knowledge did not correlate with the actual knowledge they were able to recall. Within our study, participants who identified as athletic training educators scored approximately 1 point higher (mean = 11.65  $\pm$  0.4) than the participants who identified as clinicians (mean = 10.14  $\pm$  0.11). This overall performance on the knowledge assessment would not even meet the benchmark scoring for the initial board of certification exam. The general lack of perceived knowledge and self-efficacy identified within our participants is consistent with previous research,<sup>5</sup> but in a recent study about continuing education and professional development, the researchers<sup>6</sup> indicated that athletic trainers consider Domain V their least preferred domain to study. Without a more robust continuing education system that requires athletic trainers to resolve knowledge gaps, this phenomenon will likely persist, because there is no self-motivation to engage with this content.

## Educational Best Practices

In educational theory, it is important to ensure that the learners are actively engaged and able to actually apply the skills and knowledge they have learned rather than simply be able to repeat the information.<sup>26</sup> The greater the learner's level of involvement with the subject matter, the greater the chance the learner will be able to replicate the information in future situations.<sup>27,28</sup> Thus, the process of rote memorization does not allow for learners to actively process the information that is learned.<sup>29,30</sup> Traditional rote memorization is thought to be easier, but the learner then must make a conscious choice to relate new knowledge in a meaningful way rather than simply remembering the facts.<sup>30,31</sup> Although this technique is beneficial for foundational knowledge such as anatomy,<sup>29</sup> it is important that athletic training education (at all levels) continues to deliver materials that challenge and require the learner to have a meaningful learning experience and move away from rote memorization.<sup>32</sup> Some transition to practice literature has suggested that learners in professional-level education programs may not have had the opportunity to apply administrative skills and struggled with their transition to practice,<sup>33</sup> further reinforcing the idea that engagement is necessary to reinforce concepts and engrain them into clinical use.

This educational theory, that engagement is necessary for practical use, is consistent with our findings, where participants scored lower on the knowledge retrieval questions (mean =  $4.70 \pm 1.58$  out of 11) requiring memory and recall than on the knowledge utilization questions (mean =  $5.57 \pm 1.46$  out of 10) requiring meaningful learning and application. Athletic training educators, regardless of level, must develop curricula that facilitates a deeper level of understanding across the entire subject area rather than concepts in isolation.<sup>26,34</sup>

## Health Care Delivery Systems

*Health care delivery systems* are defined as “all organizations, people, and actions whose primary intent is to promote, restore, or maintain health. This includes efforts to influence determinants of health, as well as more direct health-improving activities.”<sup>35</sup> Within our study, 9 questions were focused on health care delivery systems. Within these 9 questions, 4 questions required knowledge retrieval and 5 questions required knowledge utilization. Participants scored poorly relative to health care delivery system concepts (mean =  $3.76 \pm 1.46$  out of 9). The following will detail questions where trends indicated a large proportion of the participants either understood or did not understand the concept.

**Six Domains of Health Care.** The importance of providing high-quality patient-centered care is critical because all patients should be given all the necessary information regarding their health and additionally given the choice for their own plan of care.<sup>7</sup> Participants within our study demonstrated a poor ability (21.9% responded correctly) to identify the constructs of the Institute of Medicine's Six Domains of Health Care Quality.<sup>9</sup> This framework includes 6 aims for the current health care system: that it is safe, effective, patient-centered, timely, efficient, and equitable (Table 6). To ensure we, as health care providers, are delivering high-quality health care, we should be able to speak the language of health care providers. These tenets of

quality health care are commonly discussed among providers and health care systems.

**Value-Based Care.** Within our study, participants were asked to identify the best definition of value-based health care, but overall, they were unsuccessful at this task (23.5% responded correctly). Value-based health care is a model of health care that pays providers and hospitals on the basis of patient outcomes. There are 2 key challenges to athletic trainers in understanding value-based health care: (1) cost-containment health care facilities (common in athletic training) are not typically paid per service, and (2) athletic trainers are largely uncomfortable with measuring their outcomes.<sup>36–38</sup> These issues serve as barriers to understanding and applying value-based health care in athletic training. However, to align with the American health care system, we must measure and demonstrate value through positive patient outcomes.<sup>39</sup>

**Data-Driven Decisions.** In athletic training, there is a breadth of epidemiological data that serve the traditional athletic training settings (college/university and secondary school) in best understanding injury trends.<sup>40–49</sup> As a result of this information, athletic trainers have the ability to use not just local data but to use data from larger groups to drive clinical practice. Within our study, participants were asked to consider epidemiological data indicating that both men's and boys' soccer participants have an increased risk for lower extremity injury.<sup>43,48</sup> A majority (72.2%) of the participants correctly identified that a functional movement screen should be conducted to further assess the risk and implement a prevention program for those who are at risk. Athletic trainers must continue to take both data that are driven from their own clinical practice as well as overall trends to begin and continue implementing prevention programs for at-risk patients.<sup>50</sup>

**Quality Improvement.** Although the concepts of quality improvement have been engrained within health care since the 1980s,<sup>51</sup> athletic training has been slow to engage.<sup>1</sup> The participants in this study were able to differentiate (69.3% responded correctly) the concepts of quality assurance (ie, a retrospective review of processes and outcomes)<sup>51</sup> and quality improvement (ie, a proactive process to measure performance and implement change).<sup>51</sup> However, much of the literature suggests that athletic trainers have not collected data on clinical outcomes,<sup>36–38</sup> cost (savings and expenditures),<sup>1</sup> and satisfaction,<sup>1</sup> making it impossible to effectively engage in quality-improvement practices. This is confirmed with the knowledge utilization item relative to quality improvement, where only 13.8% ( $n = 67$ ) of participants were able to identify what action to take within a scenario. Given that the principles of quality improvement are embedded in education program expectations<sup>8,52,53</sup> as well as the standards that drive our clinical practice,<sup>54</sup> these skills are essential. Beyond the ability to demonstrate knowledge retrieval, athletic trainers need to be equipped to collect data to effectively engage in quality improvement,<sup>55</sup> which extends beyond simple self-reflection.

## Health Care Administration

*Health care administration* is defined as the “practice of managing, leading, overseeing, and administering the operation of dynamic, complex health care entities including



**Table 5. Actual Knowledge Assessment**

Question	Correct Answer	n, % correct
1. The fundamental difference between quality improvement and quality assurance is:	Quality assurance is an overarching philosophy of solving problems with best practices to achieve outcomes, whereas quality improvement is the continual process to reduce waste and improve efficiency within the health care system	336, 69.3
2. Which of the following details best practices for documentation of patient care?	Chief complaint and history, physical exam, differential diagnosis, plan of care	276, 56.9
3. When billing for health care, one must report a clinical or medical diagnosis and develop a plan of care. Which of the following coding mechanisms accounts for the diagnosis?	ICD-10-CM	301, 62.1
4. To improve patient outcomes, continuing professional development (or continuing education) should focus on changing health care practice behaviors. Which of the following best represents the best way to engage in continuing professional development that will result in behavior change and improve your patient outcomes?	Continuing professional development that will lead to behavior change should challenge the highest level of thinking in cognitive, affective, and psychometric domains of learning	116, 23.9
5. Although there are several approaches to strategic planning, the process to evaluate your organization typically follows similar steps. Place the tasks in the appropriate sequence to strategically plan for an organization:	<ol style="list-style-type: none"> <li>1. Identify the organization's current position, including present mission, long-term objectives, strategies, and policies</li> <li>2. Analyze the environment</li> <li>3. Conduct an organizational audit</li> <li>4. Identify the various alternative strategies based on relevant data</li> <li>5. Select the best alternative and gain acceptance for this overarching plan</li> <li>6. Prepare long- and short-range plans to support and carry out the strategy</li> <li>7. Implement the plan and conduct ongoing evaluation</li> </ol>	27, 5.6
6. Which of the following best way defines value-based health care?	Cost-effective, science-based health care that incorporates patient values	114, 23.5
7. Which of the following factors may result in decreased patient satisfaction?	Frequent visits with the provider to resolve the condition	205, 42.3
8. Which of the following serves as a document detailing the patient care services you are authorized to do based on an evaluation of your credentials and your performance? For example, this document might allow you to perform dry needling in your athletic training facility once you have received training and demonstrated competence for your directing physician.	Clinical privileging document	78, 16.1
9. What are best practices for traveling with prescription medications?	Secured and locked, travel with a formulary from the prescribing physician, and consult laws in the state or nation where you are traveling	340, 70.1
10. What is the MOST important consideration when providing patients written home-care instructions regarding their injury?	Publicizes the plan for information dissemination to stakeholders	381, 78.6
11. Which of the following are the Institute of Medicine's Six Domains of Health Care Quality?	Safe, effective, patient-centered care, timely, efficient, and equitable	106, 21.9
12. You have diagnosed a patient with an ACL tear and have communicated your diagnosis with the patient and family. When considering referral to an orthopedic specialist, which of the following components of the health care system should you consider if you are demonstrating competence in systems-based practice?	Potential costs related to referral, surgical intervention, and rehabilitation the patient and his or her family may experience as a result of this injury AND Potential risks of comorbidities associated with ACL reconstruction	158, 32.6



Table 5. Continued

Question	Correct Answer	n, % correct
13. You are engaged in continuous quality improvement of your clinical practice and have been evaluating your implementation of the lower extremity functional scale in patients with lateral ankle sprains. You have identified the need to implement a patient-rated outcome measure. You have taught all the staff the value of the outcome measure and how to use it, but the staff is implementing it at a rate of 10% of all lateral ankle sprains at both the onset of injury and at return to play. What is your next course of action, using a typical quality-improvement approach?	Adopt—a 10% improvement is a substantial change for implementation	67, 13.8
14. You are working with a patient who has been referred to an orthopedic specialist for a potential SLAP lesion. Which of the following communication methods is HIPAA and HITECH compliant?	You receive a notification within the electronic medical record for this patient confirming the diagnosis and requesting you schedule a telemedicine appointment to tell the patient	304, 62.7
15. You are working with a minor patient who is experiencing anxiety that is prohibiting him from performing. Which of the following are required to return to activity?	Parental consent, patient assent, and mental health provider and medical director consultation and clearance	328, 67.6
16. An athletic trainer wishing to bill a Medicare patient for athletic training services should use which of the following:	Athletic trainers are not recognized providers for Medicare patients	276, 56.9
17. The organization, including input from the athletic training staff, should evaluate the relationship with the team physician. Which of the following should be evaluated?	All of the above: <ul style="list-style-type: none"> <li>• Use of evidence-based interventions and protocols in the care planning for patients</li> <li>• Communication with other health care providers, including specialists required for complex cases</li> <li>• Medical documentation and medical record keeping</li> <li>• Health care outcomes, including the patient-reported outcomes related to return to play/daily life/work</li> </ul>	460, 94.8
18. If all of the following statements were indicative of what is occurring at your athletic training facility, which of them would you need to mark as not meeting expectations of the BOC Facility Standards?	Electrical devices and GFI outlets used near water sources are inspected annually by custodial staff	113, 23.3
19. You are evaluating your athletic training facility to improve time and patient care efficiency. What is the most effective approach to gather data about how long each clinician is spending with each patient?	Chart auditing for the start time and end time of each treatment session to calculate an average session length	450, 92.8
20. Data from large databases tell us that men's and boy's soccer players are at an increased risk for lower extremity injury. How can that data drive decision-making in your clinical practice?	Conduct a movement screen of my own to further assess risk and implement a prevention program tailored to at-risk participants (including bracing/taping and neuromuscular control)	350, 72.2
21. Which of the following constitute best practices for developing, consulting, and approving policies and procedures in an athletic training facility?	Consult with the AT staff, medical director, and overseeing administrators and after all stakeholders have consulted and approved the policies and procedures, have the organization's general counsel sign and date an approval of the materials.	195, 40.2

Abbreviations: ACL, anterior cruciate ligament; AT, athletic trainer; BOC, board of certification; GFI, ground fault interrupter; HITECH, Health Information Technology for Economic and Clinical Health Act; ICD-10-CM, *International Classification of Diseases, Tenth Revision, Clinical Modification*; SLAP, superior labral tear from anterior to posterior.

**Table 6. Six Domains of Health Care Quality<sup>9</sup>**

Domains	Definitions
Safe	Avoiding harm to patients from the care that is intended to help them
Effective	Providing services on the basis of scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and misuse, respectively)
Patient-centered	Providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions
Timely	Reducing waits and sometimes harmful delays to both those who receive and those who give care
Efficient	Avoiding waste, including waste of equipment, supplies, ideas, and energy
Equitable	Providing care that does not vary in quality due to personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status

hospitals, long-term care facilities, health care systems, nursing homes, pharmacies, and health insurance providers.”<sup>56</sup> Within our study, a total of 12 questions were focused on health care administration. Within these 12 questions, 7 questions required knowledge retrieval and 5 required knowledge utilization. Overall, the participants scored poorly relative to health care administration (mean = 6.51 ± 1.63 out of 12).

**Measuring Patient Satisfaction.** Patient satisfaction is measured through the value of health care services, attaining, improving and maintaining health, and personal experience at the point of care.<sup>57</sup> In our study, participants were unable to identify that frequent visits with a provider to resolve the condition may result in decreased patient satisfaction (42.3% responded correctly). Previous research has identified that physicians and patients are exceptionally satisfied with athletic trainers, especially compared with entry-level physician assistants and nurse practitioners in physician practice.<sup>58</sup> To combat the increasing number of patients seeking out health care without increasing providers, physician offices may employ athletic trainers; those that did noted improvement in physician practice productivity<sup>59</sup> and an increased number of patient encounters from 10% to 30%.<sup>59,60</sup> Employing athletic trainers in the physician-practice setting also had a significant impact on both the time before scheduling an appointment<sup>21,61</sup> as well as for the in-clinic wait time for patients.<sup>21,62,63</sup> Unfortunately, no similar data are available for traditional athletic-training settings. The lack of data on patient encounters, patient satisfaction, and the benefits of employing an athletic trainer in various settings serves as a challenge in athletic training and in our attempts to demonstrate our value to employers.

**Standing Orders and Privileging Documents.** Athletic trainers are required to work under the direction of another

health care provider, which varies according to specific state practice acts. Written documents to guide the relationship between physician and athletic trainer are infrequent. Standing orders are guidance documents used by all providers within an organization with the same credentials, allowing an athletic trainer to practice under the full scope of practice as dictated by each state practice act.<sup>64</sup> Privileging documents are common in the American health care system and privilege-specific health care providers who demonstrate training and qualification to perform a skill. In athletic training, every provider should have written guidance for their role, but specific skills should be privileged by a directing physician. Participants in our study were unable to identify a clinical privileging document (16.1% responded correctly), even though these kinds of relationships are detailed in professional resource documents.<sup>65</sup> These findings raise concerns that athletic trainers may not be engaged in robust relationships with directing physicians and may not be practicing at the top of their license.

### Centers for Medicare and Medicaid Services Billing.

Third-party billing has long been an initiative of the NATA.<sup>65</sup> Limitations by organizations such as the Centers for Medicare and Medicaid Services since 2004 have created challenges to providing care to physically active patients insured through Medicaid and Medicare for athletic trainers working in the emerging settings. Within our study, only 56.9% of the participants were able to properly identify that athletic trainers are not able to bill for service under Medicaid and Medicare. There continues to be confusion and assumptions made that simply on the basis of the regulations from Medicaid and Medicare, athletic trainers are unable to bill in any state under other insurers. However, several states allow athletic trainers to bill for service, and in 2014 the NATA partnered with Ohio, Indiana, and Wisconsin state organizations to pilot recognition of athletic trainers from third-party payer systems.<sup>66</sup> Additional efforts, specifically the initiative to ensure all athletic trainers have a National Provider Identifier, have potential to increase the number of companies and insurance plans that reimburse for athletic training services and demonstrate the value that athletic trainers can have even outside of traditional patient populations.<sup>66</sup> The majority of our participants possessed their National Provider Identifier (n = 431, 88.9%), which perhaps demonstrates their basic understanding of the initiatives to bill for service.

### Limitations

We developed the knowledge assessment using a panel of experts practicing, educating, and researching these health care delivery systems and health care administration topics. The experts were asked to consider future educational standards and current domains of clinical practice. They were asked what critical concepts were necessary to practice effectively in today’s American health care system, and they agreed the tool was comprehensive. However, even like the board of certification exam, not all concepts can be explored. It is possible that the tool was forward looking, but the findings still have value in identifying the areas in which athletic trainers need additional training. Future research should explore innovative instructional strategies at all levels of education that can elevate the knowledge, skills, and abilities of learners relative to health care delivery systems and

health care administration topics. In addition, the continuing education system in athletic training must address the issues of self-directed learning that continue to yield knowledge and practice gaps in the profession.

## CONCLUSIONS

As we consider the evolution of the health care system in the United States, it is important that we continually assess the knowledge of athletic trainers related to this domain of clinical practice. Generally, athletic trainers lacked knowledge regarding health care delivery systems and health care administration. Moreover, athletic trainers demonstrated a poor relationship between perceived knowledge and knowledge retrieval questions and between self-efficacy and knowledge utilization questions. This means that overall, athletic trainers believed they knew and could accomplish more than they are able to currently do in relation to these concepts. The profession continues to seek opportunities for athletic trainers to serve as health care executives through their role in quality improvement and system-wide change, yet the lack of knowledge coupled with a high self-concept highlights the need for continuing education and professional development. Educators did score higher than clinicians on the knowledge assessment, but there is a need to continue to advance knowledge as new professional education standards emerge to prepare the next generation of athletic trainers.

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