

Improving Athletic Trainers' Knowledge of Clinical Documentation Through Novel Educational Interventions: A Randomized Controlled Trial

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Context: Athletic trainers (ATs) have reported the need for more educational resources about clinical documentation.

Objective: To investigate the effectiveness of passive and active educational interventions to improve practicing ATs' clinical documentation knowledge.

Design: Randomized controlled trial, sequential explanatory mixed methods study.

Setting: Online module(s), knowledge assessment, and interviews.

Patients or Other Participants: We emailed 18 981 practicing ATs across employment settings, of which 524 ATs were enrolled into a group (personalized learning pathway [PLP = 178], passive reading list [PAS = 176], control [CON = 170]) then took the knowledge assessment. A total of 364 ATs did not complete the intervention or postknowledge assessment; therefore, complete responses from 160 ATs (PLP = 39, PAS = 44, CON = 77; age = 36.6 ± 11.2 years, years certified = 13.9 ± 10.7) were analyzed.

Main Outcome Measure(s): Knowledge assessment (34 items) and interview guides (12–13 items) were developed, validated, and piloted with ATs before study commencement. We summed correct responses (1 point each, 34 points maximum) and calculated percentages and preknowledge and postknowledge

mean change scores. Differences among groups (PLP, PAS, CON) and time (preintervention, postintervention) were calculated using a 3×2 repeated-measures analysis of variance ($P \leq .05$) with post hoc Tukey HSD. Semistructured interviews were conducted (PLP = 15, PAS = 14), recorded, transcribed, and analyzed following the consensual qualitative research tradition.

Results: No differences in the preknowledge assessment were observed between groups. We observed a group \times time interaction ($F_{2,157} = 15.30$, $P < .001$; partial $\eta^2 = 0.16$). The PLP group exhibited greater mean change ($M = 3.0 \pm 2.7$) than the PAS ($M = 1.7 \pm 3.0$, $P = .049$) and CON ($M = 0.4 \pm 2.2$, $P < .001$) groups. Descriptively, ATs scored lowest on the legal ($61.3\% \pm 2.1\%$), value of the AT ($63.7\% \pm 4.3\%$), and health information technology ($65.3\% \pm 3.7\%$) items. Whereas ATs described being *confident in their documentation knowledge*, they also identified *key content* (eg, legal considerations, strategies) which they deemed valuable.

Conclusions: The educational interventions improved ATs' knowledge of clinical documentation and provided valuable resources for their clinical practice; however, targeted continuing education is needed to address knowledge gaps.

Key Words: personalized learning pathway, professional development, continuing education, health information technology

Key Points

- Completing a reading list or online interactive modules on clinical documentation improved athletic trainers' knowledge of clinical documentation; however, greater improvement occurred among athletic trainers who completed the interactive personalized learning pathway.
- Most athletic trainers were confident in their knowledge of clinical documentation but identified knowledge gaps related to legal requirements. Therefore, targeted continuing education on strategies to securely store and communicate about patient-protected information is needed.
- Athletic trainers also scored poorly on items related to health information technology and health care informatics, which reinforces the need for more educational resources in this area.

Clinical documentation is a standard of professional practice, and athletic trainers (ATs) deem it to be important for legal protection and to track patient progress.^{1–4} Beyond these important reasons to document, routine and high-quality clinical documentation can also be used to promote the

value of employing an AT, communicate services provided among health care providers, and inform clinical decisions regarding treatment and return to activity.^{2,4} However, only 46% of ATs have reported that they always document the athletic training services they provide and commonly cite

lack of time, uncertainty of what to document, and the need for more educational resources to guide their documentation practices.^{3,5,6} Many ATs have reported learning the basics of documentation in their professional program, but the content and depth of the lesson (eg, application to patient cases; subjective, objective, assessment, and plan [SOAP] format; inclusion of the disablement model; and use of patient-reported outcomes) were inconsistent.⁷ Subsequently, ATs may rely on personal experiences or employer requirements to guide their documentation practices; however, less than half of supervisors have reported having written guidelines on clinical documentation.⁸

Authors of prior studies on documentation have focused on capturing ATs' reasons for, mechanics of, and barriers to documenting, but little is known regarding ATs' actual knowledge of best practices in clinical documentation.^{4-6,9} In 2017, the National Athletic Trainers' Association (NATA) *Best Practice Guidelines in Athletic Training Documentation* was released and established a framework for documenting across the profession.² However, these guidelines do not provide tips for how to document efficiently, standard protocols regarding minimal details to document, nor strategies for assessing the quality of their documentation. Some specific recommendations to address legal aspects of documentation exist (eg, concussion management), but this knowledge transfer may not span to improve documentation practices for every patient encounter.¹⁰

To the best of our knowledge, no single repository of resources currently exists for ATs to learn more about specific criteria and strategies to efficiently document patient care. Therefore, we developed 2 educational interventions on clinical documentation with different learning formats (ie, interactive and directed module, self-paced reading list) that were accessible online at no cost.¹¹ Whereas many continuing education (CE) programs evaluate participant satisfaction instead of knowledge acquisition, we believed it was important to assess learning outcomes since documentation is an essential part of clinical practice.¹² Therefore, we investigated the effectiveness of educational interventions in improving ATs' knowledge of clinical documentation. The following research questions are addressed in this paper:

- (1) How knowledgeable are ATs about clinical documentation?
- (2) Did the educational interventions improve ATs' knowledge of clinical documentation?
- (3) What information did ATs find most valuable from the educational interventions?

METHODS

Design

This paper is part of a larger sequential explanatory mixed methods project that explored ATs' knowledge of clinical documentation before and after completing an educational intervention. We followed a previously published protocol for a randomized control trial to evaluate the effectiveness of an interactive versus passive learning mechanism.¹³ The full description of the development of the clinical documentation educational interventions was published by Welch Bacon et al.¹¹ Additionally, to understand ATs' experiences with the educational materials, we used the consensual qualitative research (CQR) approach.^{14,15} The CQR approach has been commonly used in athletic training research to

explore perceptions while minimizing biases through the use of multiple researchers and a systematic, transparent approach throughout data analysis.^{4-6,9,16,17}

Intervention Materials and Instruments

The online educational interventions and knowledge assessment were hosted in Qualtrics. The primary research team (T.M.K., S.L.N., C.E.W.B.) has an extensive record collaborating on projects regarding clinical documentation. Therefore, we developed 2 online educational interventions: (1) an interactive, guided platform and (2) a comprehensive list of reading materials.¹¹ The interactive personalized learning pathway (PLP) consisted of 8 separate modules with short videos, readings, reflection prompts, quizzes, and a space within the platform to take notes. The passive reading list included 14 hyperlinked resources that were grouped into 8 topic areas that matched the PLP modules. Three subject matter experts provided feedback on the content of the educational interventions, and minor adjustments to formatting were made before piloting with 20 ATs. Based on pilot feedback, we added the anticipated time to complete each PLP module, a progress bar, and a back button. For the PAS reading list, we reorganized materials into specific categories and added headings to visually separate materials on the web page. The detailed description of the development, validation, and piloting of the educational interventions are published in Welch Bacon et al and are outlined in Figure 1.¹¹

To assess ATs' knowledge of clinical documentation, we developed an instrument based on published research and best practices.^{2-7,9,18} The same subject matter experts reviewed the 35 multiple choice items and commented on item clarity, accuracy, and comprehensiveness. We made minor revisions for clarity to 10 items based on their feedback. To pilot the instrument, we administered it before and after the 20 ATs piloted the PLP (n = 10) and PAS (n = 10) interventions. Item mean change scores (preintervention and postintervention) indicated improvement in pilot ATs' knowledge after completing 1 of the interventions (PLP: M = 4.9% ± 14.8%, PAS: M = 4.0% ± 13.5%). Item scoring was also evaluated within and between groups, and the instrument was deemed to have good discrimination. Additionally, pilot participants' comments on the items were collected after completing the postknowledge assessment, which resulted in minor changes for clarity to 11 items, and 1 item was deleted. Thus, the final instrument included 34 items. Scores from piloting were not included in the study findings.

To qualitatively evaluate the educational interventions and participants' experiences, the primary research team (T.M.K., S.L.N., C.E.W.B.) developed interview guides that built on prior research on documentation.^{4,9,16,17} An internal auditor with extensive qualitative research experience assessed the guides, provided feedback, and determined they were clear and captured the objectives of the study. The guides contained core questions regarding ATs' prior educational preparation on clinical documentation, their knowledge and confidence regarding clinical documentation, and their experience with the educational materials (Table 1). The full interview guides were published by Nottingham et al.¹⁹ No modifications or clarifications were necessary after the initial interview within each group; therefore, these interviews were included in the analysis.

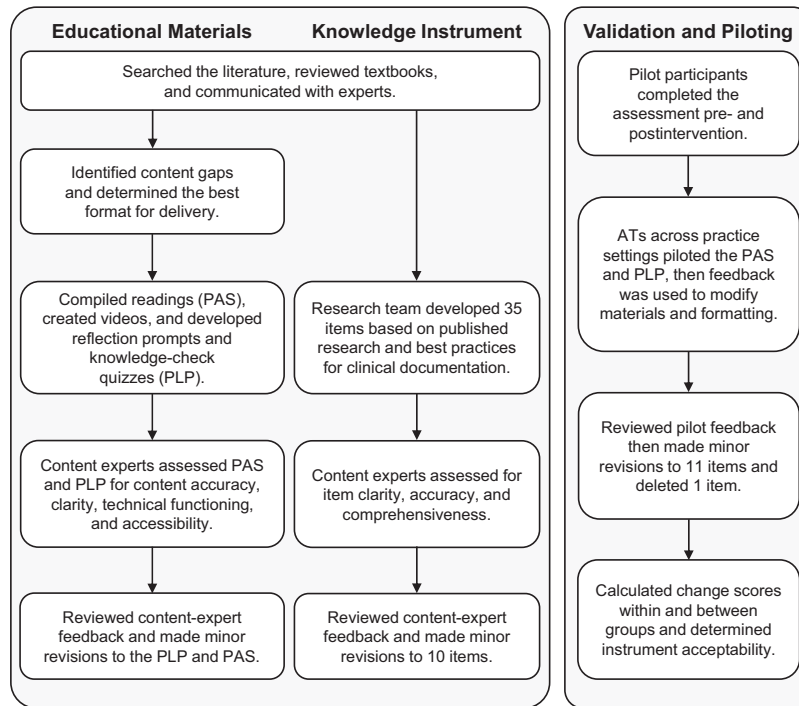


Figure 1. Development and validation of educational materials and the knowledge assessment instrument. Abbreviations: AT, athletic trainer; PAS, passive reading list; PLP, personalized learning pathway.

Study Procedures

Figure 2 illustrates participant recruitment, enrollment, completion of the interventions, and data analysis procedures. Clinical documentation is a required component of ATs' clinical practice; therefore, all certified members of the NATA across all clinical practice settings, excluding full-time educators, were invited to participate using the NATA survey system. Certified ATs ($n = 18\,979$) were emailed a description of the study and a hyperlink to enroll. A total of 582 ATs started

the enrollment survey, and 561 ATs submitted the survey, of which 37 ATs did not meet the inclusion criteria or did not consent. Therefore, eligible ATs who enrolled in the study ($n = 524$) were randomly assigned to groups (PLP = 178, PAS = 176, CON = 170) and took the online knowledge assessment. Participants did not receive feedback regarding their performance on the knowledge assessment at that time. They were then given a separate hyperlink to their educational intervention (CON, PAS, PLP) and 4 weeks to complete the educational intervention (or no intervention for the CON participants), and the PLP and PAS participants were emailed reminders at the 2- and 3-week marks. After week 4, participants took the knowledge assessment again, which concluded the study. The PLP and PAS participants who indicated willingness to be interviewed at the end of the postknowledge assessment were contacted 1 week after the study concluded. One researcher (S.L.N.) completed all interviews on a web-based teleconferencing platform (Zoom), and interviews were transcribed verbatim. A research assistant helped with reviewing the deidentified transcripts for clarity before analysis.

Table 1. Summary of Core Interview Items for the PLP and PAS Participants^a

Items about prior preparation
(1) Please tell me about your past experiences learning about athletic training clinical documentation.
(2) Please reflect on the pros and cons of learning documentation in these formats.
Items directed to the PLP versus PAS reading list
(3) Please reflect upon your knowledge of clinical documentation prior to...
(4) Please reflect upon your confidence with clinical documentation prior to...
(5) Please tell me your general thoughts about the...
(6) What did you find helpful about the...?
(7) Please reflect upon your knowledge of clinical documentation after the...
(8) Please reflect upon your confidence with clinical documentation after the...
(9) Overall, were you satisfied with the...? Why or why not?
(10) Is there anything you would change about the...? If so, what?
(11) Is there anything else you would like to add regarding clinical documentation or your experiences with the...?

Abbreviations: PAS, passive reading list group; PLP, personalized learning pathway group.

^a Reproduced in its original format.

Data Analysis and Management

Quantitative Analysis. Frequencies, percentages, means, and SDs were calculated for knowledge items preintervention and postintervention. The total knowledge score was calculated by summing 1 point for each correct response for a maximum score of 34 points. Mean changes between total knowledge scores were compared preintervention and postintervention. A 3×2 repeated measures analysis of variance and post hoc Tukey HSD tests were calculated to compare between-groups (PLP, PAS, CON) and time (preintervention, postintervention) with $P < .05$ as the criterion for statistical significance. We obtained adequate power based on preliminary power analysis

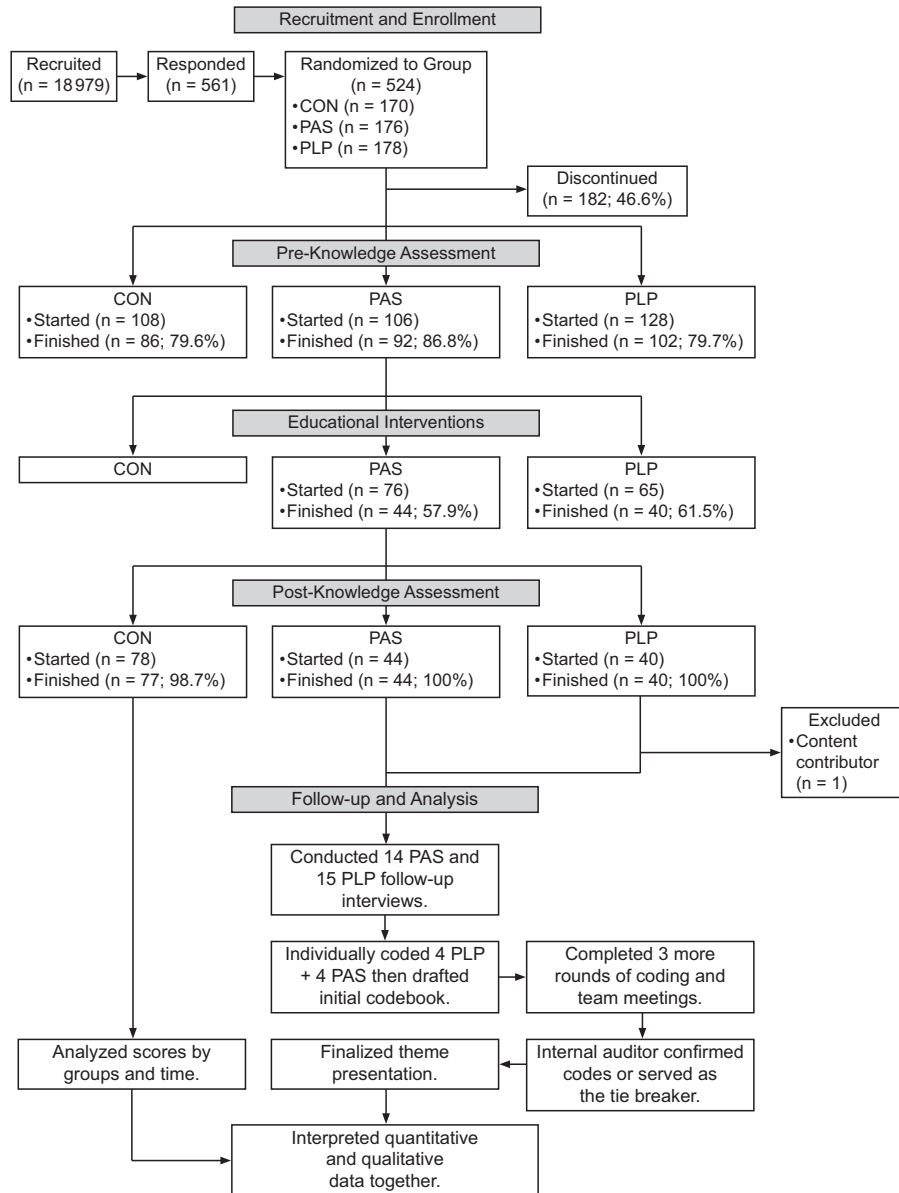


Figure 2. Study procedures and analysis. Abbreviations: ATs, athletic trainers; CON, control group (no resources); PAS, passive (reading list organized by topics) group; PLP, personalized learning pathway (videos, readings, reflections, quizzes) group.

(G*Power 3) that required 38 participants per group to detect a small effect size of 0.20 to achieve 90% power.

Qualitative Analysis. We used the CQR approach to guide analysis and confirm data saturation during our consensus meetings.^{14,15} The primary research team (T.M.K., S.L.N., C.E.W.B.) individually analyzed 4 PLP and 4 PAS transcripts and then met to develop an initial codebook. In the second round of analysis, we individually coded 2 PLP and 2 PAS transcripts, then met to make minor revisions to the initial codebook. We used this final codebook for 2 additional rounds of independent coding while using a rotating-auditor approach to analyze all remaining transcripts.^{16,17} For example, C.E.W.B. coded 6 PLP transcripts, T.M.K. coded 6 PAS transcripts, and S.L.N. coded 6 PLP and 6 PAS transcripts. After meeting to discuss questions or discrepancies, the fourth round of analysis involved the rotation of a set of coded transcripts among researchers to cross-check codes. For the final round of analysis, the internal auditor reviewed the codebook and served as a

tie breaker for any codes that had not obtained consensus from the previous cross-checking round. The primary research team met again to review and finalize the presentation of qualitative themes and interpret the quantitative results together. Trustworthiness was established using multiple-researcher analysis and triangulation of data sources. To confirm the study was thoroughly reported, we used the consolidated criteria for reporting qualitative research checklist.

RESULTS

Figure 2 outlines participants' completion of knowledge assessments, educational interventions, and follow-up interviews. A total of 160 ATs (age = 37.6 ± 11.2 years; years certified = 13.9 ± 10.7) completed the educational intervention (or control) and postknowledge assessment (CON: $n = 77/85$, 90.6%; PAS: $n = 44/92$, 47.8%; PLP: $n = 39/102$, 38.2%). Additional demographics are presented in Table 2.

Table 2. Participant Demographics

Demographic Characteristic	No. (%)
Highest degree earned	
Bachelor's	29 (18.1)
Master's	119 (74.4)
Clinical doctorate	8 (5.0)
Academic doctorate	3 (1.9)
Professional degree	1 (0.6)
Gender identity	
Woman	90 (56.3)
Man	67 (41.9)
Genderqueer	2 (1.3)
Prefer not to say	1 (0.6)
Race or ethnicity	
Asian or Pacific Islander	2 (1.3)
Black or African American	3 (1.9)
Hispanic or Latino	4 (2.5)
White or Caucasian	143 (89.4)
Multiracial or biracial	5 (3.1)
Prefer not to say	3 (1.9)
Employment setting	
Secondary school	71 (44.4)
College or university	51 (31.9)
Clinic	11 (6.9)
Hospital	1 (0.6)
Physician practice	4 (2.5)
Military	7 (4.4)
Professional athletics	4 (2.5)
Public service	1 (0.6)
Industrial or occupational	5 (3.1)
Other	5 (3.1)
Role as a preceptor	
Yes	50 (31.3)
No	110 (68.8)

Demographic characteristics (eg, age, gender identity, race or ethnicity, employment setting) did not differ among groups. Regarding the follow-up interviews, 29 interviews (15 PLP, 14 PAS) were completed, and participants' demographic characteristics are provided in Table 3. We analyzed the quantitative and qualitative data separately, then interpreted the findings together (Figure 3).

Quantitative Knowledge Assessment Scores Preintervention and Postintervention

At the onset of the study, ATs self-reported that they were comfortable ($M = 4.2/5.0 \pm 0.6$) and competent ($M = 4.0/5.0 \pm 0.7$) regarding their knowledge of clinical documentation. Group demographic characteristics (age, years certified, gender, race or ethnicity, employment setting, and documentation approach) did not differ between groups. Also, no statistical differences were found between groups in the preknowledge assessment scores. We identified a significant group \times time interaction ($F_{2,157} = 15.30$, $P < .001$; partial $\eta^2 = 0.16$). Post hoc analysis of mean change scores revealed the PLP ($M = 8.82\% \pm 7.94\%$, $P < .001$) and PAS ($M = 5.00\% \pm 8.82\%$, $P = .012$) groups improved significantly more than the CON group ($M = 1.18\% \pm 6.47\%$). Additionally, the PLP group exhibited a greater mean change than the PAS group ($P = .049$).

Descriptive analysis of individual items demonstrated that more participants in the PLP group correctly answered items related to details required in treatment logs (100%, $n = 39/39$;

Table 3. Interview Participants' Characteristics

Pseudonym ^a	Years Certified	Degree Attained	Setting
Passive reading list (PAS) group			
Bella	5	Bachelor's	Secondary school
Brooke	11	Master's	Industrial or occupational
Eleanor	9	Clinical Doctorate	Secondary school
George	21	Bachelor's	Hospital
Greg	11	Master's	Secondary school
Janie	15	Master's	Club or rec sports
Liam	19	Master's	Clinic
Lucas	14	Master's	College or university
Lynn	9	Master's	College or university
Marie	12	Master's	College or university
Mircalla	2	Master's	Secondary school
Rebecca	16	Master's	College or university
Rinna	7	Master's	Secondary school
Ross Bob	2	Master's	Secondary school
Personalize learning pathway (PLP) group			
Ari	13	Master's	College or university
Charlie	13	Master's	Secondary school
Derek	9	Master's	Secondary school
Han	13	Master's	College or university
Hot Gobbler	29	Bachelor's	Secondary school
Jazzy	9	Academic Doctorate	College or university
Jenny	6	Master's	College or university
John	4	Master's	Military
Linus	10	Clinical Doctorate	College or university
Mark	36	Master's	Secondary school
Michelle	6	Master's	Secondary school
Pam	7	Bachelor's	College or university
Roger	2	Master's	Secondary school
Ruthie	31	Master's	Clinic
Austin	21	Master's	College or university

^a Interview participants selected their own pseudonyms.

PAS = 86.4%, $n = 38/44$; CON = 83.1%, $n = 64/77$) and inclusion of a discharge note at the completion of the patient's care (94.9%, $n = 37/39$; PAS = 93.2%, $n = 41/44$; CON = 75.3%, $n = 58/77$). Collectively, participants scored poorly on the postknowledge assessment for items related to appropriate use of abbreviations (44.4%, $n = 71/160$), strategies for maintaining system security (13.1%, $n = 21/160$), the definition of a personal health record (48.1%, $n = 77/160$), and the description of health information technology (41.9%, $n = 67/160$). Table 4 includes additional descriptive data for select items from the postknowledge assessment and related interview quotes. Figure 4 illustrates the postknowledge assessment mean scores when grouped by topic area and sample interview quotes regarding the key content.

Qualitative Theme: Knowledge of Clinical Documentation

A theme regarding ATs' knowledge of clinical documentation emerged, specifically about their perceived confidence in their knowledge and skills and key content they identified from the educational interventions. Categories and frequency counts are also presented in Figure 3.^{14,15}

Category 1: Perceived Confidence in Their Knowledge and Skills. Most participants were confident in their knowledge and skills regarding clinical documentation. Eleanor (PAS) said:

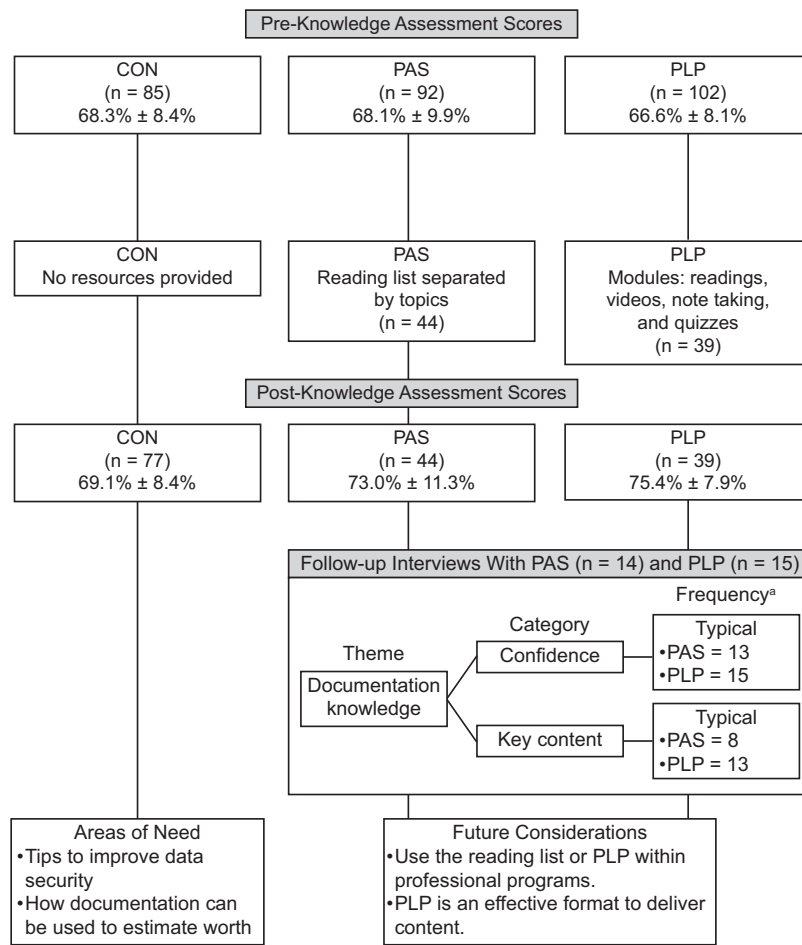


Figure 3. Study findings and key points. Abbreviations: CON, control group; PAS, passive reading list group; PLP, personalized learning pathway group. Note: Frequencies of coding were labeled per group: *general*: PAS = 14, PLP = 15; *typical*: PAS = 7–13, PLP = 8–14; *variant*: PAS = 2–6, PLP = 3–7; *rare*: PAS = 1, PLP = 1–2.^{15,16}

I feel like I do a pretty decent job of documentation, and when I'm done documenting, I feel like I did it to the best of my abilities, but I think I also know that we can all be better and how we practice our skills with anything.

Jenny (PLP) evaluated her confidence and knowledge as moderate. She commented:

I think I would feel okay if I was called into court and how to present my notes, for the most part. I know that there's certain situations where I was like on the sideline, and I probably didn't document as much as I needed to because it was in a game setting. So confidence and documentation for acute emergency stuff, [I am] definitely not as confident. For the rehabs and more long-term stuff, [I am] pretty confident in that.

However, some participants' perceptions of their knowledge and confidence changed after completing the educational intervention. Ross Bob (PAS) said:

I think prior to reading the resources, I was confident in my documentation system and style just because I didn't realize or I didn't know what all could or should be included in documentation. . . I don't think it was far behind, just because I learned that stuff in my professional program, but I don't think it was as robust as it should have been.

Austin (PLP) expressed a similar experience:

I always thought I did okay with my documentation. Listening to some of the other ATs speak [in the PLP], I know that I don't do a good enough job. . . I know I do an okay job in the initial part, but the follow-up care, I'm not always the greatest to keeping that documentation.

A few participants were not confident in their documentation. George (PAS) shared, "I feel like time constraints, like everything is a juggle in life. I don't feel as confident in my documentation because I don't feel it is as thorough as I could make it."

These qualitative statements align with quantitative knowledge assessment scores. Participants described their general confidence with documenting patient encounters and athletic training services, which matched their higher scores on items related to patient cases and standards and reasons for documenting. However, participants also identified the need to continue to improve on their strategies to document effectively and promote legal protection, which were lower performing items in the knowledge assessment.

Category 2: Key Content. Participants who completed 1 of the educational interventions also discussed key content within the materials provided. Eleanor (PAS) shared:

I found the part about value and worth and that whole section very, very interesting and very, very valuable. So

Table 4. Sample of Athletic Trainers' High- and Low-Performing Topic Areas Regarding Clinical Documentation

Item	Control (n = 77)	PAS (n = 44)	PLP (n = 39)	Additional Interview Quotes About Key Content
Areas of strength in the postknowledge assessment (% correct)				
Minimal expectations for documenting patient encounters	85.7%	84.1%	89.7%	I think the most helpful thing was just how it clarified some of the information. Something along the lines of what to document when an athlete comes in for treatment, like if they're coming in for an ice bag or if they're coming in for first aid, coming in for rehab, like what kind of [information] you need to include in there. — Rinna (PAS)
Including the date and clinician signature when adding to a previously documented note	92.2%	90.9%	92.3%	It wasn't like the patient-reported outcome measures were unknown to me prior to this, but I think it showed me a lot of like areas of resources to actually look through and spend some time going through where I can put it in an efficient manner, so I always felt like utilizing those was something where I don't know if I'll ever be able to do this. — Derek (PLP)
Identifying an example of a specific patient-reported outcome	90.9%	90.9%	94.9%	
	74.0%	79.5%	82.1%	
Areas for improvement in the postknowledge assessment (% correct)				
Outside of EMR communication, document emails in patient's file, then delete off server	51.9%	61.4%	56.4%	It gave me a lot of ideas on the treatment log. Having kids signing in because there's talk about how a lot of people just have a paper sign in for kids to do and how that could be an issue with FERPA. —Michelle (PLP)
Use of chart audits to assess quality	54.4%	54.5%	64.1%	I also liked how it talked about using your documentation to prove your worth because that's something that we're trying to do right now where I work is prove that we need more athletic trainers by using the data that we have. So that was interesting. — Pam (PAS)
Estimated monetary cost of services (worth)	27.3%	22.7%	25.6%	
Law requiring "meaningful use" of EMRs as of January 1, 2014	31.2%	59.1%	43.6%	

Abbreviations: EMR, electronic medical record; FERPA, Family Educational Rights and Privacy Act; PAS, passive reading list group; PLP, personalized learning pathway group; SOAP, subjective, objective, assessment, and plan.

I think that's a very hot topic in athletic training in general right now—trying to work on increasing our pay and showing where we fit into the health care model, how we can save patients money, how we can be more accessible. I think that kind of thing is very important, especially when we're trying to shoot for insurance reimbursements.

Several participants commented on the legal implications of documentation. Pam (PLP) elaborated:

It definitely made me think more about the legal ramifications of [documentation]. We're really bad about using text for a lot of things, and it's not super secure. So we're working on transposing all of our records right now to a digital format, and just all of the considerations that go into that are not really something that's been on the forefront of my mind, in terms of like security.

Participants also found the different strategies for documenting and clarifying which details to document to be insightful. Lynn (PAS) shared:

I like the [resource] where they were talking about different ways to be more effective at documentation. I think that one was helpful in that it provided more options as opposed to just leaping ahead and/or going straight to the computer.

Linus (PLP) said, "There was a lot of really good stuff in there. Documentation audits is a big one." Jenny (PLP) said, "It was nice to see the discharge notes mentioned because I think a lot of ATs, myself included, often forget to write a formal discharge note." She went on to say that reminders about abbreviations and the importance of consistency between notes were helpful. For Ross Bob (PAS), clarifying information about electronic medical records (EMRs) was important:

I think the most helpful was explaining differences between EMR and EHR [electronic health record], and so that difference was helpful just especially going between a physician clinic and my clinical sites because I work in EMRs, and my physician primarily uses EMR and EHR, so learning that difference was very helpful.

Participants' statements about key content identified from the educational interventions also matched lower-performing items in the quantitative knowledge assessment. They highlighted areas such as using documentation to promote the value of an AT or recognizing health information technology terms that were not as familiar to them at the onset of the study. This category demonstrates that, regardless of the format of the educational resources, participants identified valuable content they could apply to their clinical practice.

DISCUSSION

To the best of our knowledge, this is the first study to use a randomized control trial design to investigate ATs' knowledge of clinical documentation before and after completing an educational intervention. To address the overarching research questions, we identified that ATs deemed themselves to be competent and confident in their knowledge of clinical documentation, but knowledge gaps (eg, legal considerations, demonstrating value of an AT, health information technology)

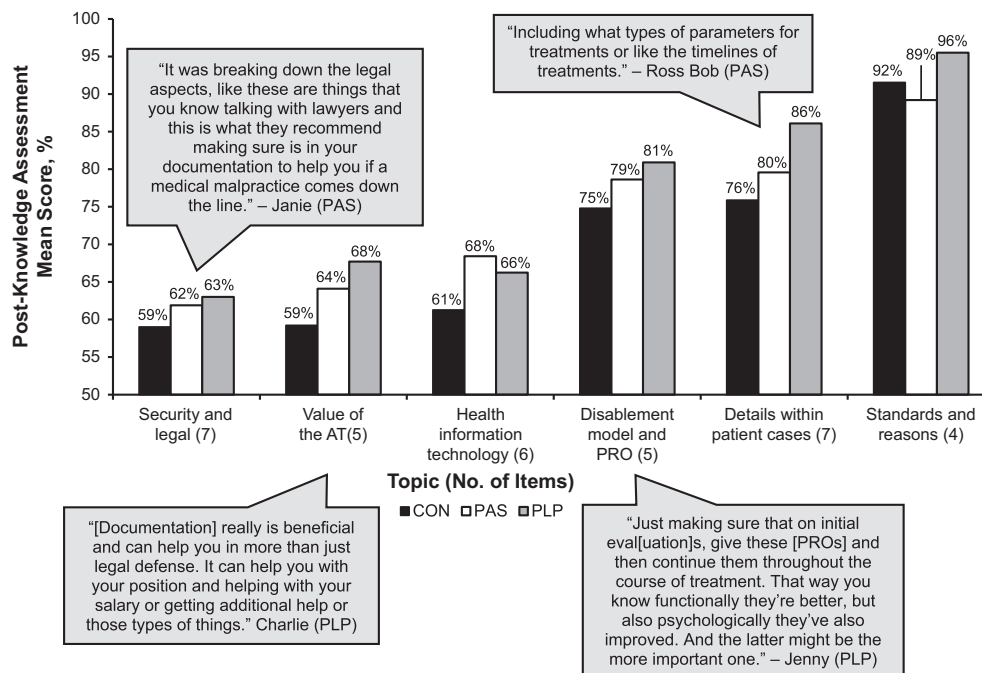


Figure 4. Descriptive comparison of postknowledge assessment mean scores by topic and additional interview quotes. Abbreviations: AT, athletic trainer; CON, control group; PAS, passive reading list group; PLP, personalized learning pathway group; PRO, patient-reported outcome.

still existed. We observed greater improvements for ATs who engaged in the PLP or PAS intervention than those who did not. Additionally, the PLP group exhibited greater change than the PAS group. Together, the findings indicate these educational interventions were effective in improving ATs' knowledge of clinical documentation and suggest that the PLP is a promising platform for CE. Personalized learning pathway and PAS participants also found the details about documenting a complete patient case, how to demonstrate value and worth of an AT, and strategies for documenting efficiently to be particularly helpful.

Areas of Strengths Regarding Clinical Documentation

Participants across groups were knowledgeable about professional standards and reasons for documenting patient care. They also correctly answered items related to the details included within patient cases (eg, information within SOAP note sections, how to update a note) and qualitatively reported their overall confidence in documenting patient encounters. This aligns with previous reports that ATs across practice settings document for similar reasons (eg, professional responsibility, legal protection, tracking patient progress) and commonly use the SOAP note format.^{3-5,16,17} Participants in the current investigation also identified that the materials on strategies to streamline and cross-check documentation practices were helpful. For example, Linus (PLP) valued learning about chart auditing, and Rinna (PAS) appreciated clarification of what details to document. The NATA Best Practices in Athletic Training Documentation outlines many recommendations, but it appears that ATs want more specific examples and strategies of how others are implementing these recommendations.²

Another noteworthy area was ATs' knowledge of patient-reported outcomes (PROs). Although we did not evaluate

ATs' use of PROs in this study, participants correctly identified general versus specific PROs and how they differed from clinician-reported outcomes, which is an improvement in ATs' familiarity with PROs compared with a prior study.²⁰ This is unsurprising, as the athletic training profession continues to evolve, but guidance for administering PROs as routine practice is still needed. For example, Jenny (PLP) and Derek (PLP) reflected on a module in which a PRO was seamlessly integrated into the patient case and highlighted the importance of capturing the patient's perspective. Including PROs in all patient scenarios within professional education and CE programs is one way to promote PRO use and its role in documenting a complete patient case. Supervisors should also consider establishing expectations for their staff to implement PROs during patient care, and using chart audits and peer review within the workplace may improve quality and compliance with documentation.¹⁶

Regardless of completing the passive reading list or interactive online modules, ATs found the materials to be valuable and significantly improved their knowledge compared with the control group. Furthermore, PLP participants demonstrated greater improvement than PAS participants, which suggests the PLP format is an effective way to deliver information in a cost-effective, convenient, and learner-focused method.^{11,13} It is likely the variety of media, such as reflection prompts, graphic lecture style, or videos of practicing clinicians describing their documentation strategies, increased the relevancy of the information and kept the participant engaged. Since ATs have reported that interest and accessibility drive their decisions on CE programs to complete, the PLP active learning format may help keep ATs focused to better facilitate knowledge acquisition, particularly since they are already taxed with balancing CE among other work and personal responsibilities.^{21,22}

Areas for Improvement Regarding Clinical Documentation

It is not surprising that the control group, who did not complete an educational intervention, scored the lowest and exhibited no significant improvement in their knowledge scores. Although the PLP and PAS groups did exhibit significant improvement in their knowledge, knowledge gaps still exist. For all ATs, the most pressing need is to address strategies to promote legal protection and data security. In the current study, ATs scored poorly on items regarding safely securing electronic and paper-based patient health information and ensuring email communication is saved to a patient file and deleted off a server. Additionally, ATs in our study reflected on possible Health Insurance Portability and Accountability Act (HIPAA) and Family Educational Rights and Privacy (FERPA) violations with commonly used paper sign-in sheets or forgetting that text messaging was not a secure method for communicating health information. Although legal protection may be a primary reason that ATs document, their performance on these items suggest they may be less protected than they realize.^{3,4} Therefore, engaging in periodic CE on clinical documentation, auditing a random selection of patient charts, and reflecting on current behaviors would be beneficial for ATs' legal protection throughout their career.

In the current investigation, ATs across groups also scored poorly on items related to health information technology and estimating the value of an AT. Interestingly, these topics were also identified during interviews as key content learned within both educational interventions. The Health Information Technology for Economic and Clinical Health Act calls for the use of technology such as EMRs.²³ As the athletic training profession continues to respond to changes in technology and the health care system, it is important for ATs to also adopt and use EMRs.²⁴ Athletic trainers have previously reported challenges with internet connectivity, firewalls, or administrative support regarding the use of EMRs; however, emphasizing how EMRs can help limit HIPAA or FERPA violations may garner administrators' support.⁹ Documenting in an EMR at the point of care ensures it is completed in a timely manner and can also improve documentation quality to better capture the athletic training services provided and estimate the cost of those services to demonstrate the value of employing an AT.²⁴ Although ongoing CE in this area is still needed, our educational interventions appear to be a great starting place with practical application of health care economics (eg, showing return on investment) and health information technology (eg, using EMRs, improving documentation compliance and quality) to promote the vitality of the profession, which are also components of the prioritized athletic training research agenda.²⁵

Limitations and Future Research

Findings from this study may be limited in transferability based on participant characteristics. We sent an email to the NATA membership to broaden participation across employment settings, years of experience, and other member characteristics; however, it is possible that more members who were already confident in their knowledge of documentation elected to enroll in the study. Whereas many participants dropped out before completing the preknowledge assessment, this attrition is not surprising. It is possible participants did not want to take the lengthy knowledge assessment or that the Category D Board of Certification continuing education

units (CEUs) were less of an incentive to complete all study components. It is also likely the anticipated time requirement (PLP = 4–5 hours, PAS = 2–3 hours) affected the completion rate, but these educational resources were intended to be comprehensive, accessible in 1 place, and could have been completed at any time over a 4-week period. Whereas the completion rate was not as high as desired, the study was adequately powered even without Category A CEUs, and future completion of these educational interventions would not require completion of a preknowledge nor postknowledge assessment. Therefore, we believe these comprehensive educational interventions on clinical documentation are valuable to practicing clinicians. Furthermore, the PLP has been approved for Category A CEUs starting January 2024, which may provide additional incentive to complete it.

Moving forward, these educational resources on clinical documentation will require updating in the future as best practices shift or as policies change. Although we observed improvements in PLP and PAS participants' knowledge of clinical documentation, we did not track their behaviors nor specific changes made to their documentation practices after the intervention. Whereas improving knowledge of clinical documentation is important, consideration of how to promote knowledge retention and knowledge translation is also needed. Future researchers should explore the learners' perceptions of self-directed versus interactive mechanisms and whether different formats affect knowledge retention and translation to clinical practice.

CONCLUSIONS

Clinical documentation is a professional standard of athletic training practice and is essential for legal protection, tracking patient progress, and characterizing ATs' practice. Athletic trainers in the current investigation were knowledgeable about reasons to document patient care and components to document in a complete patient case but were less knowledgeable about the details to ensure legal protection and terms related to health information technology. Ongoing emphasis on legal considerations in documentation is necessary to enhance ATs' legal protection. Whereas the educational intervention was effective in significantly improving ATs' knowledge of documentation, the interactive online platform was associated with greater improvement than the passive reading list. Therefore, these educational materials can be used for professional development on clinical documentation, and the use of an interactive, personalized learning pathway could be an effective format for other topics in athletic training.

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