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Preferred Physical Therapist/Physical Therapist Assistant Relationship Content in a Doctor of Physical Therapy Curriculum: A Longitudinal Approach

Debra Ough Sellheim, PT, PhD, and Jessica Scholl, PTA, MA

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Background and Purpose. The need for physical therapist (PT) students to graduate with strong teamwork knowledge and skills has never been greater. Although many PT educational programs are preparing graduates to work effectively in an interprofessional team environment, attention to the corresponding importance of collaborative intraprofessional (PT/PT assistant [PTA]) preparation for efficient, cost-effective patient care must not be lost.

Method/Model Description. Starting in the first course of the program, learning experiences on the preferred PT/PTA relationship are woven throughout multiple courses over the 3-year Doctor of Physical Therapy (DPT) curriculum. Students practice components of effective teaming, make decisions about the direction and supervision of a PTA, and deepen their understanding of the legal and ethical complexities of PT/PTA teams in practice. Specific learning activities on the PT/PTA relationship are described.

Outcomes. Survey data and class learning experience and assignment feedback on the PT/PTA curriculum reveal multiple themes related to PT student learning using this model. Themes include increased understanding and confidence in PTA knowledge, skills, and roles; recognition of the potential for increased efficiency and improved patient care with PT/PTA teaming; and the importance of PT/PTA communication and relationship. Most respondents to a 1-year postgraduation alumnae/i survey report the collaborative PT/PTA educational experiences helped prepare them for clinical practice with PTAs.

Discussion. The need for physical therapy services is increasing, and as professionals, PTs have an obligation to meet this need in a cost-effective way. Using the skills of a PTA continues to be an effective strategy to address this issue. PT students are often not prepared to direct and supervise PTAs in the clinic due to insufficient educational preparation.

Conclusion. This curricular thread model incorporates content pertaining to direction and supervision of PTAs and intraprofessional team building across a 3-year DPT program to better prepare clinicians for practice.

Key Words: PT/PTA relationship, Physical therapy education, Intraprofessional teams.

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BACKGROUND AND PURPOSE

Porter and Lee's[1] strategies to "fix health care" include organizing clinicians into integrated team practice units and measuring outcomes and the cost of care for patients. They argue for the need to improve matching of personnel skills to tasks and focusing the time of the most expensive staff on work using their full skill set.[1] The need for physical therapist (PT) students to graduate with strong teamwork knowledge and skills has never been greater with this increased movement to integrated or interprofessional practice. Many PT educational programs are implementing interprofessional education (IPE) activities to prepare graduates to work effectively in a team environment to provide cost-effective and patient-centered care.[2–7] Not to be lost with the spotlight on IPE, however, is the corresponding importance of intraprofessional practice—preparing graduates with the knowledge and skills needed to facilitate the preferred PT/PT assistant (PTA) relationship to maximize the potential for cost-effective, efficient, quality physical therapy services.[8,9]

Arising from an inadequate supply of PTs to meet the need for their services, since the late 1960s, the use of PTAs to provide physical therapy services has been viable and credible.[8,10–13] Although the utilization of PTAs has not been without controversy,[14–20] since that time, the number and employment of PTAs has continued to increase to help meet the growing demands for productivity, efficiency, and cost reduction in health care.[8,10,12] Despite this growth, many PTs have graduated with minimal information in their curricula on the role, utilization, and direction of PTAs.[9,12] This lack of educational preparation may be a contributing factor to complaints and disciplinary actions taken by state Boards of Physical Therapy due to inappropriate supervision or direction to support staff, including PTAs.[21]

The American Physical Therapy Association (APTA) has developed numerous publications to help educate PTs, PTAs, and students on the role and proper utilization of the PTA and the responsibility of the PT in the direction and supervision of the PTA.[22–34] The current APTA position statement that physical therapy can only be provided by a PT or a PTA under the direction and supervision of a PT supports the need for education about the preferred PT/PTA relationship.[35]

Despite the available resources, there is evidence that the amount of education PT students receive on the preferred PT/PTA relationship could be improved.[9,12,36] The lack of curricular time spent on the role and utilization of the PTA in PT education programs was a challenge described over 25 years ago.[37] This lack of education may have been a factor

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in the findings of Robinson et al[12] who surveyed PTs in 1986 and 1992 regarding their perceptions of the role delineation and responsibilities of the PTA. Findings indicated that therapist perceptions were generally consistent with APTA guidelines for PTA delivery of care. The authors determined, however, that the disparities between published guidelines and perceptions held by PTs for a number of tasks related to the role of the PTA may lead to inappropriate or inefficient utilization of the PTA. Over half of the respondents in that paper indicated they had received no information on the role of the PTA in their education. Using the same survey instrument, Robinson et al[38] investigated PTA perceptions of PTA roles. Although results indicated general consistency between PTAs and PTs regarding documented roles of PTAs, some instances of differing perceptions suggested the need for more clarity about the role delineation between PTs and PTAs to achieve optimal delivery of physical therapy services. More recent studies continue to report insufficient interaction between PT and PTA students and a need for improved education of PT and PTA students about each other's functions.[9,36]

Several investigators have looked at the influence of the clinical education component of curricula on PT and PTA student knowledge and attitudes toward each other.[9,36,39–41] Physical therapist students have reported increased learning about the PTA's role, knowledge, and skills when able to interact with PTAs during their full-time clinical experiences.[36,39,40] Improved communication skills and more effective intraprofessional collaboration and consultation were additional outcomes.[9,36,39] These studies also found inadequate academic preparation of students regarding PT and PTA roles and abilities[9] and a need for the PT student to be more comfortable in the PT role before PT/PTA teaming in clinical education.[36] A shift in PT students' attitudes toward PTAs on some survey items[40] and a decrease in PT student accuracy on questions related to PTA roles after a clinical education experience raise questions about the influence of the clinical environment on student learning.[41]

There is a paucity of literature exploring methods of classroom preparation of PT students on the PT/PTA relationship. The use of a collaborative intraprofessional case-based learning experience before clinical education in the first year of a PT education curriculum has been shown to improve PT student learning about the PTA role as compared to traditional content delivery.[41,42] Plack et al[8] demonstrated how shared PT/PTA student classroom experiences can improve student knowledge of the preferred PT/PTA relationship and roles as well as enhance affective skills needed for building effective relationships. This paper also found a difference in how often issues of direction and utilization of the PTA were discussed in their respective curricula. Physical therapist assistant students reported these issues being discussed in every course while that was not the experience of the PT students. Most PT students reported making clinical decisions based on information from clinical experiences versus information learned in the classroom.[8] This basis for decision making could have negative implications for patient care given findings that accuracy about PTA tasks decreased after a clinical experience[41] and that clinicians have inaccurate information related to a number of PTA utilization tasks.[12,38] Cavallo and Richter[40] and Plack et al[8] note that curricular experiences and the educational environment have the potential to lead students to developing misconceptions and negative attitudes about PTA or PT students before clinical education. Opportunities to establish effective and accurate attitudes and knowledge may be most feasible during a student's educational process and should occur early in students' education to facilitate the open lines of communication necessary in the preferred PT/PTA relationship.[8,40,43]

The academic preparation of PT and PTA students on each other's roles has also been a concern of the Commission on Accreditation of Physical Therapist Education (CAPTE). Based on findings from a random review of PT and PTA education programs' self-study reports, CAPTE adopted a position paper on the expectations for the education of PTs and PTAs regarding direction and supervision.[44,] The position paper states that PT and PTA education programs will be cited if learning activities and assessment of learning does not include this content.[44] The APTA Board of Directors has also been attentive to this issue as demonstrated in the association's Education Strategic Plan 2006–2020.[45] Goal 16 of this plan states the intent to "promote interprofessional (eg, interdisciplinary) and intraprofessional education within physical therapist and physical therapist assistant curricular models."[45(p6)] Subsequent objectives include identifying and distributing information on models and best practices of interprofessional and intraprofessional education.[45]

Intraprofessional Team and Relationship Skills

To best meet the needed outcomes, PT curricula need to include not only the proper supervision and utilization of the PTA but also how to collaborate and work as an effective team. Mathews et al[9] found that to achieve ideal communication and collaboration of PTs and PTAs, increased educational preparation may be needed. Typically, PT and PTA students get little exposure to working together as a team during their education.[36] As such, it is important to prepare students in teamwork theory and the competencies needed for collaborative intraprofessional practice during their educational programs.

Although there are anecdotal reports of the characteristics of effective PT/PTA teams in the literature,[46,47] only 1 paper of PT/PTA teaming competencies was found by the authors. Jelley et al[48] surveyed Canadian PT and PTAs on their perceptions of essential competencies for effective and efficient intraprofessional practice. Communication and collaboration were the top 2 rated categories. Other categories included assignment of tasks, consultation, and roles and responsibilities.

One can also draw from the research on effective intraprofessional relationships completed by other health care professions including nursing, occupational therapy, and dental/oral health.[49–53] Effective team characteristics include being reliable and responsible, mutual respect for the individual and his/her professional role, effective 2-way communication, and professionalism in all aspects of the job and in the relationship.[51–53] Within nursing practice, MacPhee et al[49] found that trust and respect are the basis for effective teams and that conflict was often associated with "power dynamics such as hierarchical role differences" between differing degree levels of nurses. Other investigators found nursing collegialism was negotiated through positive tactics such as task and knowledge sharing and emotional support as well as through negative tactics such as coercive threats or the suppression of dissension.[50]

Because PTs and PTAs differ in their educational backgrounds and power/status levels, there is the potential for competition, jealousy, and the lack of knowledge of the other's background to limit effective teamwork. Education and shared learning experiences have the potential to diffuse these barriers to effective teamwork and launch graduates ready to function at a high level in a team environment. The purposes of this paper are to 1) describe a curricular model for incorporating student learning experiences on the preferred PT/PTA relationship implemented at the course level and integrated across a 3-year Doctor of Physical Therapy (DPT) curriculum and 2) share student and alumnae/i self-reported outcomes related to the curricular model.

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MODEL DESCRIPTION AND EVALUATION

Institutional and Curricular Overview

This PT education program, with 34 students per class, is situated in a liberal arts university with associate, baccalaureate, and graduate programs. A PTA program is one of the associate degree programs. The DPT curriculum is atypical in that courses are organized around practice settings rather than academic disciplines. Students take 1 course at a time, and content within each course is purposefully organized, so that there is a close juxtaposition of medical/behavioral science and clinical application. Since academic disciplines do not define courses in this curricular model, course content is organized into 4 streams that flow through all courses of the curriculum (Figure 1). Within each stream, content is further organized into "threads" that are named similarly to how courses are named in a traditional PT education program (Table 1). The value of iterative learning and reflection are key to the curricular philosophy. The sequencing and juxtaposition of content, both in the classroom and clinic, allows for progression, or spiraling, of learning from basic to complex such that reflective, active, and deep learning is facilitated. A detailed description of this curricular model has been previously published.[54,55]

Development of the Physical Therapist/Physical Therapist Assistant Curricular Thread

Since the inception of the PT education program in 1991, the program has had the unique situation of having a PTA employed as a faculty assistant in both the DPT and PTA programs. Under the supervision of ranked faculty, faculty assistants may engage in teaching, testing, support services, curriculum development, and other teaching related functions. Although objectives focused on the direction and supervision of the PTA were already included in the DPT curriculum, the faculty assistant recognized gaps in the DPT curriculum related to what was being taught about PTAs and brought the topic forward to the DPT faculty for discussion. With the support of the DPT faculty, the DPT curriculum director and the faculty assistant conducted a thorough review of learning objectives related to the role and supervision of the PTA and PT/PTA teaming to determine existing strengths and gaps in what was being taught. Specific PT/PTA curricular content and timing of the content throughout the curriculum were also reviewed. Based on this review, opportunities to systematically infuse learning experiences related to the PT/PTA relationship across the 3-year curriculum were identified and presented to faculty. Although the faculty response was primarily positive, there were some concerns expressed by faculty about adding more content to an already full curriculum. Many of these concerns were addressed by modifying existing learning experiences to incorporate the additional PT/PTA content.

Objectives and Examples of the Physical Therapist/Physical Therapist Assistant Curricular Thread

The overarching PT student learning outcomes for the PT/PTA curricular thread include a knowledge of the educational background of the PTA, state and legislative statutes and rules, and APTA positions relative to direction and supervision of the PTA; communication and teaming skills; skills to manage potential barriers to effective teaming; and the development of a framework of types of tasks to direct and to whom. Specific course learning objectives, derived from these learning outcomes, are listed in Table 2. Learning activities were designed with these outcomes in mind, with the ultimate goal of improving PT students' ability to direct and supervise PTAs in clinical practice. Assignments challenge PT students to access and use available legal, professional, and ethical resources pertaining to direction and supervision of PTAs. The design of the learning activities also encourage PT students to decide what to direct to a PTA and how much supervision to provide considering factors such as skill level and experience of the individual PTA, criticality of the patient's status and a clinician's experience working with PTAs.[56] Finally, the PT/PTA curricular thread creates a venue for current issues in practice to be discussed and debated. Recent issues included in the curriculum are the direction and supervision of support personnel other than the PTA, reimbursement of services provided by the PTA, and advancement of the PTA associate degree to the baccalaureate level.

Course objectives and learning activities for the PT/PTA relationship content are embedded in most courses throughout the DPT curriculum. See Appendix A (Supplemental Digital Content 1, http://links.lww.com/JOPTE/A77) for a calendar of the embedded learning activities. The complexity of the activities and decision making is advanced as students progress through the curriculum. Descriptions of selected learning experiences and assignments are detailed below.

Example 1. To prepare for the first collaborative activity with the PTA students, the PT students are introduced to the role of the PTA through a lecture conducted by a PTA at the beginning of year 1. The PT students are presented with a brief history of why the PTA position was created, educational requirements for the PTA, and basic information on the PT's role in direction and supervision. The students read Watt's[56] seminal article, *Task Analysis and Division of Responsibility*, and provide a written response to several guided questions (Appendix B, Supplemental Digital Content 1, http://links.lww.com/JOPTE/A77). Although Watt's[56] article was written in 1971, it remains relevant and is a useful tool in determining what can be directed to a PTA and how much supervision to provide. Three weeks after this

Figure 1. Content streams represented in course years 1–3.

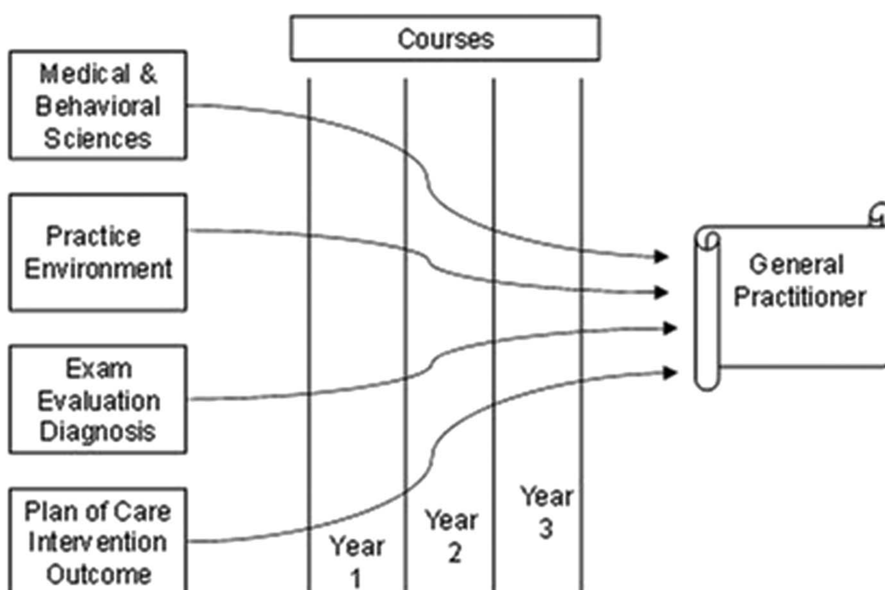

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Table 1. Curricular Threads Within 4 Content Streams

Medical/Behavioral Sciences	Practice Environment	Examination, Evaluation, and Diagnosis	Plan of Care, Intervention, and Outcome
Anatomy Physiology Kinesiology Biomechanics Pharmacology Neuroscience Pathology Nutrition Diagnostic imaging Behavioral science Research/evidence-based practice Teaching/learning Motor learning	Ethics Communication Cultural competence Professional practice Leadership Practice management PT/PTA relationship Interprofessional education	Musculoskeletal Neuromuscular Cardiopulmonary Integumentary Medical screening Gait Health promotion/wellness	Musculoskeletal Neuromuscular Cardiopulmonary Integumentary Medical screening Gait Therapeutic exercise Biophysical agents Health promotion/wellness

Abbreviations: PT = physical therapist; PTA = physical therapist assistant.

introductory lecture, the first-year PT and second-year PTA students attend a program-sponsored Leadership Symposium. Second-year PTA students were chosen to be involved in this learning activity as the PTA students enter the program with only 8 required hours of physical therapy observation as compared to the 60 hours required of PT students. An additional 6-week part-time clinical experience completed during their first year enables the PTA students to participate more fully in the event. Practicing PT and PTA clinicians, who demonstrate leadership professionally or in their communities, are invited to speak and interact with students during the symposium. Each clinician shares his/her personal story of leadership development and then facilitates a small group of 7–8 PT and PTA students in activities and discussion about leadership. Near the end of the symposium, PT and PTA students interview each other guided by a list of suggested questions provided by faculty. PT students subsequently turn in a 1- to 2-page written reflection on their initial perception of the role of the PTA and whether that perception changed after the symposium experience. Faculty members keep a copy of this reflection to give back to the students in year 3 (see example 4 below). At the end of the symposium, students complete an evaluation form that asks them what aspects of the symposium were most and least helpful, what changes they would suggest, and if they have any other comments.

Example 2. In fall semester of year 2, PT students join with second-year PTA students for a collaborative treatment planning learning activity. Before the class session, PT students are introduced to a paper patient and in small groups develop a plan of care based on provided examination and evaluation information. Copies of the PT students' plans of care are distributed to the PTA students, and both student groups come to the joint class session with intervention ideas and thoughts about who could deliver the various interventions. The students meet in small groups for 2 hours and engage in collaborative care planning for the patient. PT students must engage in evaluative clinical reasoning as part of their decision making on the direction of interventions to the PTA. The activity concludes with a discussion of case scenarios that highlight the legal, professional, ethical, and interpersonal issues that often occur with intraprofessional teaming. Examples of these case scenarios are located in Appendix C (Supplemental Digital Content 1, http://links.lww.com/JOPTE/A77). At the end of the session, students complete a written evaluation of the learning experience responding to 6 Likert scale questions about preparation for the session and learning outcomes from the session. They also report 1–2 "take home" messages/outcomes from the experience related to effective PT/PTA teaming.

Example 3. In the fall semester of year 3, PT students participate in a structured debate focusing on the issue of support personnel. In this simulated case, students are "working" at an outpatient clinic and have been asked to help decide whether the clinic should hire an athletic trainer or a PTA. Using a variety of resources, students analyze and prepare arguments for both sides before the debate. On the day of the debate, students are randomly assigned a position to defend as a debate team. A structured debate lends itself well to discussion of professional issues. Debate topics can be changed to reflect current practice issues.

Example 4. The final activity of the PT/PTA curricular thread occurs during a third-year ethics and leadership summit just before graduation. The PT students review available legal, professional, and ethical resources on the PT/PTA relationship, share and reflect on their experiences working with PTAs throughout their clinical education rotations, and have the opportunity to discuss any remaining questions. Students complete a final written reflection assignment in which they review their initial reflection on the PT/PTA team (see example 1), written in their first DPT course of year 1. Students respond to questions related to how their knowledge, perceptions, and competence in the skills required to team with a PTA have progressed and changed over the course of their 3-year DPT educational program.

In addition to the examples highlighted above, there are several additional learning experiences and written assignments spaced throughout the curriculum (Appendix A, Supplemental Digital Content 1, http://links.lww.com/JOPTE/A77). Physical therapist students are presented with clinical situations from a variety of practice settings where they must consider contextual factors and are asked to decide whether or not to direct interventions to a PTA and provide a rationale supporting their decision. Each of these assignments presents a profile of a PTA and patient/client information. For example, in an acute care case, the PT student analyzes and justifies his/her decision to allow or not allow an experienced PTA to change an assistive device from a walker to a quad cane after gait training has been initiated by the PT (Appendix D, Supplemental Digital Content 1, http://links.lww.com/JOPTE/A77). In an assignment involving wound care, the PT students are

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Table 2. Graduate Survey: Level of Preparation in PT/PTA Curricular Content (Classes 2013–2016; n = 126/130; 96.9% Response Rate)

On Completion of the PT/PTA Curricular Content I Am Able to:	Well-Prepared	Adequately Prepared	Underprepared
1. Identify components of the preferred PT/PTA relationship that promote efficient, high-quality patient/client care.	73.8%	26.2%	—
2. Compare and contrast PT and PTA expertise, educational background, knowledge, and values.	67.5%	31.7%	0.8%
3. Identify the legal and ethical basis for physical therapy service including applicable state and federal laws, and the physical therapy Code of Ethics.	73.8%	24.6%	1.6%
4. Describe the educational preparation of PT assistants, physical therapy aides, and others involved in physical therapy services.	61.9%	34.1%	4.0%
5. In accordance with the state Physical Therapy Practice Act, explain: a. Legally appropriate direction of "first treatment" b. Role of the PT and PTA in adjusting parameters within the plan of care (ie, biophysical agent parameter, massage techniques)	79.4%	19.8%	0.8%
6. Based on a set of facts involving a PT, analyze potential legal issues involving direction of duties.	76.0%	23.2%	0.8%
7. Using APTA position statements and legal and ethical guidelines, articulate and support my rationale for directing (or not directing) joint mobilizations to a PT assistant.	73.0%	25.4%	1.6%
8. During a case simulation, choose elements of a plan of care that may be directed to a PT assistant after the initial treatment, and provide a sound rationale.	81.7%	17.5%	0.8%
9. Demonstrate skills that foster PT/PTA teamwork: a. Recognition of roles b. Communication skills c. Respect for PT/PTA's knowledge base d. Appropriate direction of duties e. Effective problem solving of potential barriers to effective teamwork f. Collaborative care planning	79.4%	19.8%	0.8%
10. Apply the PTA Direction and Supervision Algorithms in decision making relative to direction of interventions to a PTA.	69.0%	29.4%	1.6%
11. Given a case scenario, ensure that examination, evaluation, diagnosis, prognosis, and plan of care are conducted by a PT and not a PT assistant and explain why this is the case.	86.5%	13.5%	—
12. Identify legal, ethical, professional, and behavioral issues in a PT/PTA team case scenario.	81.6%	17.6%	0.8%

Abbreviations: APTA = American Physical Therapy Association; PT = physical therapist; PTA = physical therapist assistant.

asked to use legal, professional, and ethical resources to support an argument for and against directing interventions such as sharp debridement to a PTA.

Besides the relationship building that occurs during the joint classroom learning experiences, opportunities to interact with PTA students outside of the formal classroom further facilitate team building. In a culminating service learning experience for both programs, PT and PTA students spend 2 weeks working together in an immersion

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Table 3. Outcome Themes of PT/PTA Classroom Learning Experiences (Model Examples 1, 2, and 4)

Themes	Quotes From Evaluation of Student Learning Experiences
Increased knowledge and understanding of PTA perspective/views, roles, and educational background	*"The interview portion gave us the opportunity to understand a PTA's perspective and their roles."* (Leadership Symposium) *"When I first started PT school, I was not exactly sure how a PTA could be utilized in a clinical setting, how thorough of an education they received, or why somebody would choose to be a PTA over a PT. Over the past 3 years, I feel my view of PTAs, what they can do, and how knowledgeable they are has changed tremendously. I have a much better understanding of what their education entails and how helpful and important they are to patient care."* (Year 3 Final Integration/Reflection)
Importance of PT/PTA communication and relationship	*"Communication is key. Be willing to have conversations that might be difficult. We are all on the same team and want what is best for the patient."* (Year 2 geriatric course DPT/PTA student session) *"Working together and keeping open communication allows both PTs and PTAs to work at the top of their license."* (Year 2 Geriatric Course DPT/PTA Student Session) *"My initial reaction to reading my reflection from DPT 5000 [1st DPT course/Leadership Symposium] was how naïve I was. I definitely understood the importance of having a good PT/PTA relationship and how, ultimately, it is the patient who either suffers or benefits from the quality of the PT/PTA relationship. However, I had no idea how to achieve a productive and positive PT/PTA relationship. I was idealistic and had no concept of what that relationship actually looked like clinically and how much effort and intentionality is required to establish a productive working relationship… We were well prepared in school with many resources to utilize."* (Year 3 Final Integration/Reflection)
Effective PT/PTA teaming can increase efficiency and improve patient care	*"We're on the same team and same page—it's all about the patient. Great ideas from both PT and PTAs, more experience and eyes → better for the patient."* (Year 2 Geriatric Course DPT/PTA Student Session) *"I now understand … that the ultimate goal to strive for—[PT/PTA] teamwork and communication—can allow a patient to thrive and achieve their outcomes quicker and more effectively."* (Year 3 Final Integration/Reflection)
Increased knowledge about and confidence in direction/supervision of a PTA	*"I am happy with the PTA thread we have had throughout this curriculum because I feel competent and confident in my ability to direct and supervise a PTA as a new graduate."* (Year 3 Final Reflection) *"From working with PTAs [clinical] and completing the PT/PTA thread in the program, I feel that now I have a much better understanding of the decision making process when determining what is appropriate to be directed to a PTA….I have a better handle on what the team and relationship should look like."* (Year 3 Final Reflection)
More opportunities to interact with PTA students	*"Why don't we have more arranged time/classes with the PTAs to build teamwork/relationships?"* (leadership symposium) *"It would be nice to spend more time with the PTA students to interact."* (leadership symposium) *"It was nice to get to collaborate with the PTA class; we should do it more often. I think it will be very beneficial in the working world."* (Year 2 Geriatric Course DPT/PTA Student Session) *"I wish there was more time for just open discussion and social events to build these [PT/PTA student] relationships and networking."* (Year 3 Final Reflection)

Abbreviations: DPT = doctor of physical therapy; PT = physical therapist; PTA = physical therapist assistant.

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Table 4. Survey of 2006–2018 Alumnae/i One-Year Postgraduation

	Have Worked or Are Presently Working With PTAs	Feel the PT/PTA Educational Learning Experiences Better Prepared You to Work in the Clinic
2006 RR 70% (n = 14/20)	93%	29%
2007 RR 60% (n = 18/30)	72%	50%
2008 RR 52% (n = 14/27)	79%	57%
2009 RR 52% (n = 13/25)	85%	62%
2010 RR 60% (n = 18/30)	89%	44%
2011 RR 57% (n = 17/30)	94%	59%
2012 RR 58% (n = 15/26)	93%	60%
2013 RR 28%[a] (n = 8/29)	88%	88%
2014 RR 55% (n = 18/33)	83%	93%
2015 RR 61% (n = 20/33)	88%	100%
2016 RR 59% (n = 20/34)	94%	94%
2017 RR 67% (n = 22/33)	82%	94%
2018 RR 65% (n = 22/34)	86%	94%

Abbreviations: PT = physical therapist; PTA = physical therapist assistant; RR = response rate.
[a]Lower response rate attributed to additional 2013 program surveying of all alumnae/i.

experience at a local, national, or international service learning site. The DPT and PTA programs have also established a PT club that is open to all PT and PTA students. The PT club is led by students from both programs with a faculty liaison from each program. The PT club members plan social, volunteer, and service activities for both groups of students providing opportunities outside of the academic setting for interaction and relationship building between the student groups.

OUTCOMES OF THE MODEL

Quantitative and qualitative educational outcome data related to the model were collected from the 2013–2018 DPT program cohorts. The 2013 cohort was the first to complete the longitudinal PT/PTA thread model. For select PT/PTA learning experiences, additional years of outcome data are available as the learning experiences were in place before implementation of the model and retained as part of the longitudinal approach to the PT/PTA curricular content. Physical therapist student data include evaluation of classroom learning experiences as described above and student perceptions of achievement of the program's PT/PTA curriculum objectives collected as part of a graduate exit survey. Alumnae/i feedback on the effectiveness of the PT/PTA curriculum in preparing them for teaming with PTAs in clinical practice was collected through annual program assessment surveys. Secondary use of the assessment data was categorized as exempt by the University's Institutional Review Board. Where appropriate, under each outcome described below, the learning objectives assessed from Table 2 are noted in parenthesis.

Physical Therapist/Physical Therapist Assistant Classroom Learning Experiences Assessment

Qualitative evaluation feedback was collected on the Leadership Symposium (example 1), the Year 2 Geriatric Course DPT/PTA Student Session (example 2), and the Year 3 Final Integration and Reflection (example 4) and is summarized in Table 3. Responses to the open ended evaluation questions were initially independently reviewed by the authors using an inductive approach with no predefined coding criteria to determine categories.[57] The authors identified very similar themes as there was a great deal of consistency in the PT student responses. Determination of the final themes and selection of the supporting quotes was completed collaboratively. Quantitative data, collected as part of the evaluation of the Geriatric Course PT/PTA Student Session (example 2), are reported below in percentages.

Year 1 Leadership Symposium/Interview of a Physical Therapist Assistant Student. Two themes/outcomes of the Leadership Symposium, reported consistently across years by most PT students, relative to their interaction with the PTA students were 1) an increased understanding of the PTA perspective/views, roles, and background (Table 2 objectives 2, 4, 9) and 2) a desire for more opportunities to interact with the PTA students (Table 3). It should be noted that more opportunities to learn with and interact with the PTA students have been reported after nearly every PT/PTA activity within this model.

Year 2 Geriatric Course Joint Doctor of Physical Therapy/Physical Therapist Assistant Student Session. Quantitative data from student evaluations of this class session indicate that 96.5% (n = 330/342) of the PT students in this class session from 2008 to 2018 strongly agree or agree that the activity enhanced their understanding of PTA direction and supervision issues (Table 2 objectives 3, 5, 8, 9, 10, 11, 12). As illustrated in the quotes in Table 3, the themes that emerged from review of the "take home" messages reported by students support that they learn the importance of PT/PTA communication (Table 2 objective 9b) and that effective teaming with a PTA has the potential to increase efficiency and improve patient care (Table 2 objective 1).

Year 3 Final Integration and Reflection. Analysis of the student reflection responses on how their knowledge and skill in teaming with a PTA progressed and changed over the course of their 3-year educational program triangulated and enhanced the themes already identified in the Leadership Symposium and Geriatric Course PT/PTA session evaluations (Table 3). In addition, the theme of increased knowledge about and confidence in the supervision and direction of a PTA (Table 2 objectives 3, 5–8, 9d, 10, 12) was identified from the reflections.

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Graduate and Alumnae/i Physical Therapist/Physical Therapist Assistant Curricular Thread Assessment

Summative data on the PT/PTA curricular thread were collected from graduating students and program alumnae/i using Qualtrics surveys sent through email that contained a link to the survey.[58] The results are reported in percentages.

Graduate Surveys. The DPT program assessment plan includes an exit survey completed by each cohort in May just before graduation. Questions on attainment of the PT/PTA objectives were added to the survey for the 2013–2016 cohorts. The survey is sent in the last week of the final academic course. Students are on campus where they are reminded and strongly encouraged to complete the survey resulting in excellent response rates. The 2013–2016 cohorts were asked to rate their perceived level of preparation in 12 areas taken from first-, second-, and third-year course objectives related to the PT/PTA curricular content. Most respondents indicated they were well prepared or adequately prepared in all areas (see Table 2, objectives 1–12).

1-Year Postgraduation Survey of Alumnae/i. As part of the DPT Program assessment plan, a 2-part survey is emailed to each graduate 1-year postgraduation. A reminder email is sent 2 weeks after the original to encourage participation. As part of the survey, each graduate is asked if she/he has or currently works with PTAs in their practice and if the PT/PTA educational experiences helped better prepare him/her for clinical practice. These questions have been asked since the inaugural DPT class graduated (2006) as the curriculum has always contained 2–3 PT/PTA educational experiences. The same questions are now asked of the DPT program graduates who have completed the longitudinal PT/PTA curriculum. To date, 6 classes (2013–2018) have experienced the entire 3-year PT/PTA integrated curriculum content and been in practice for 1 year when surveyed. There has been a definite upward trend in graduates' perceptions of their preparation in the preferred PT/PTA relationship since implementation of the longitudinal curriculum (ie, 2013–2018). This is evidenced by the consistently high percentage (88–100%) of respondents during 2013–2018 who indicated the PT/PTA educational learning experiences better prepared them to work in the clinic (Table 4).

Specific comment items cited by survey respondents that helped better prepare them to work with PTAs included "*understanding the practice act and their job duties*"; "*knowing what their scope is and utilizing them at the top of their licenses, so I can be at the top of my license too*"; "*understanding their education/training*"; "*learning about legal responsibilities of PT/PTA relationship*"; and "*having Jessica talk to us often re: PT/PTA relationship and feeling open to ask questions to her*" (Table 2 objectives 2, 3, 4).

These outcomes support that the PT/PTA thread curriculum goals were achieved using this model. Although the example classroom learning experiences each had a different focus, the learning outcomes are interrelated and provide triangulation of the thematic findings. Alumnae/i outcomes validate that education on the preferred PT/PTA relationship along with shared PT/PTA learning experiences integrated throughout a DPT curriculum launches graduates well prepared to function in the PT/PTA team environment in multiple clinical settings.

DISCUSSION AND CONCLUSION

The integrated 3-year PT/PTA curricular thread described in this paper incorporates content and learning activities that focus on the direction and supervision of a PTA across several clinical settings. Students develop PT/PTA teaming skills that are transferable to multiple clinical settings through learning experiences involving differing practice setting contexts. That the skills are transferable is supported by the high percentage of graduates of the DPT program, working in a variety of settings, who report the longitudinal PT/PTA curriculum better prepared them for work in their clinic setting.

Before implementation of the longitudinal approach to teaching PT/PTA relationship content, there were PT/PTA learning activities in the DPT curriculum; however, they were not presented in an intentional, consistent, or coordinated manner. Now the PT students revisit the PT/PTA content at various points throughout the curriculum, reinforcing and building on their previous learning through reflection on clinical education experiences and synthesis of clinical and classroom learning. The iterative long-term exposure to PT/PTA preferred relationship content and the presence of a PTA faculty assistant working alongside core faculty for many of the experiences may not only reinforce student learning; it also provides a message through the formal and informal curriculum about its importance.[59]

Many of the classroom learning experiences provide opportunities to practice communication and collaboration with PTA students; 2 of the competencies Jelley et al[48] found most essential to effective PT/PTA teaming. Since implementation of the PT/PTA curricular thread, 99% of the 2013–2016 respondents reported on the graduate survey that they were adequately or well prepared to demonstrate the skills that foster this PT/PTA teamwork. These skills include recognition of roles, communication skills, respect for the PT/PTA's knowledge base, appropriate direction of duties, effective problem solving of potential barriers to effective teamwork, and collaborative care planning. As a potential added bonus, these skills are consistent with those detailed in the expanding literature on IPE and teams.[60–63] As such, PT students should be able to incorporate learned teaming principles with all health care providers.

PT student feedback on the PT/PTA curricular thread supports that one of the most valuable aspects of the learning experiences is interacting in the classroom with PTA students. The students report increased knowledge, confidence, and trust of the knowledge and skills of PTAs after in-class learning experiences and interactions. Often the PT students are surprised and impressed with how much the PTA students know. A direct result of this increased knowledge and confidence in PTAs is the high percentage (99%) of the 2013–2016 graduating PT students who felt adequately or well prepared to choose elements of a plan of care that may be directed to a PTA and provide a sound rationale for doing so. One-year postgraduation program alumnae/i report the learning is retained and prepared them for PT/PTA teaming in clinical practice. It is logical to assume that improved skill and knowledge pertaining to what can be directed to a PTA, as well as how much supervision to provide PTAs, results in PTs having more opportunity to practice at the top of their license. Appropriately matching the provider to the intervention also leads to more efficient and cost effective patient care.[1] One would additionally expect that a well-functioning PT/PTA team would result in a better working environment for both which could impact staff retention.

Throughout all the PT/PTA learning experiences, PT students are challenged to access and use the professional, legal, and ethical resources that guide direction and supervision of PTAs. Routine use of these resources may help combat Plack et al's[8] finding that many decisions PTs make in the clinic are based on information they learned during clinical experiences. The clinical education of PT students is particularly important in light of research indicating that PT clinicians may have received no information on the role of the PTA in their education or may hold inaccurate information related to a number of PTA utilization tasks.[12,38] Colgrove and Van Hoose[41] recently found PT students experienced "unlearning" of classroom content on the role of the PTA during a clinical education experience. This finding could indicate that students are experiencing dissonance between classroom learning and what they observe in the clinic and that

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inaccurate clinical instructor knowledge and perceptions of the PTA role passed along to students overrides classroom learning.[41,64] Improved academic preparation before and after clinical education experiences can help bridge the academic and clinical practice gap relative to the PT/PTA relationship. Having the opportunity to revisit and spiral PT/PTA content and reflect on clinical experiences throughout the 3 years of their education, versus 1–2 isolated learning experiences, provides multiple occasions for students to discuss discrepancies between their academic learning and what was observed and practiced in the clinic. It is our belief that graduates well versed in the preferred PT/PTA relationship will have the knowledge and confidence to educate other practicing clinicians and serve as role models to students as they learn about the preferred PT/PTA relationship.

Although not necessary for implementation of the PT/PTA learning activities described in this paper, student feedback indicates support and appreciation for the involvement of a PTA in the delivery of this content. Having a PTA in the classroom alongside a PT faculty member can model the relationship between the 2 in the clinic and may help address the need identified by Jelley et al[36] for students to be more comfortable with PT/PTA teaming before clinical education. Students are able to learn firsthand about the educational preparation of a PTA, the rules and regulations pertaining to direction and supervision of a PTA, and see effective teaming in the classroom setting. It can also provide a safe place to ask questions of a PTA and share experiences before or after clinical education.

Many institutions either have, or the potential exists, for partnerships with neighboring PTA educational programs. Our outcomes and existing literature indicate there is significant value in bringing both groups of students together for socializing or collaborative learning activities.[8] Many of the collaborative learning activities described in this paper could be delivered in face-to-face or virtual modes depending on physical proximity to a PTA program. For example, PT or PTA students could travel to meet for in-person interviews and discussion about their respective roles in the PT/PTA team. Collaborative care planning activities could occur virtually. Physical therapist program faculty could invite PTAs into their classrooms to participate in teaching various classroom or laboratory learning activities to promote learning outcomes described in the paragraph above.

The challenges experienced during implementation of this PT/PTA curricular thread were minimal because of the support of the DPT program director and faculty who value curricular innovation. In addition, for the most part, development of existing learning experiences was able to be modified rather than creating new or additional activities. Although we experienced a smooth transition implementing this integrated curricular thread, we recognize there may be challenges for institutions looking to incorporate similar content and strategies. Potential challenges could include existing DPT faculty not having the interest in or knowledge of PTA education, direction, and supervision. There could be reluctance from some or all faculty members to add additional content or modify existing activities to include information about the PTA. This factor can be especially challenging in already overcrowded curricula with ever increasing expectations and demands. Coordinating schedules for collaborative learning activities for PT and PTA students can also present a significant challenge. Finally, as the emphasis on IPE continues to increase it may take priority over preparation of students for intraprofessional practice.

Limitations

This work has limitations. The model was implemented with a relatively small number of PT students at 1 university which houses both a PT and a PTA educational program. As such, the model may not readily work for other PT education programs. The reliance on student and alumnae/i self-report on the assessment instruments is a limitation of the model's outcomes. Finally, although survey response rates were good, it is unknown whether the nonrespondents had different perceptions of the model from those of the respondents. In hindsight, a formal research paper comparing cohorts who have not gone through the longitudinal PT/PTA curriculum with those who have completed the model would have provided additional and stronger outcome data. Contrasting the impact of covering the PT/PTA relationship content in this integrated approach across multiple courses as compared to a single course would be of interest. The impact of having a PTA participating in the education of PT students also warrants further investigation as does how more thorough and intentional PT/PTA relationship preparation impacts PTA utilization in clinical practice.

CONCLUSION

Physical therapist assistants can play a significant role in partnership with PTs in the delivery of efficient, cost-effective physical therapy services.[8,9] It is vital that PT students are prepared with the knowledge, skills, and professional attitudes for this partnership before entering the workforce.[65] This integrated PT/PTA curricular thread model may be useful to PT educators who wish to improve the preparation of their students to appropriately use and supervise PTAs in clinical practice.

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