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Abstract

Occupational therapy (OT) educators strive to design learning experiences to enhance OT students' clinical reasoning and promote preparedness for the complexities of clinical practice. Occupational therapy programs have collaborated with the Amyotrophic Lateral Sclerosis (ALS) Association and taken a novel approach to the development of interprofessional experiential learning through student-led ALS Caregiver Learning Labs (CLLs). A retrospective pre-test post-test study was completed to identify outcomes related to participation in three different ALS CLLs embedded into a master's level OT curriculum. A 6-point rating scale questionnaire was used to assess students' perception of their clinical reasoning, clinical skills, and comfort level. Improvement was noted in the level of comfort when interacting with caregivers and students' perceptions of their clinical skills and clinical reasoning improved across all questions. In addition, students completed a case study assignment to examine clinical reasoning performance. On average, post-lab scores were higher than pre-lab scores for each question, and the differences were statistically significant with the level of significance at $p < 0.05$. Results suggest that a CLL experience is an effective learning method to increase students' comfort level interacting with caregivers, enhance students' perception of clinical reasoning ability, and improve clinical reasoning skills. Occupational therapy students benefited from the experience at different levels of progression, delivery methods, and opportunities for interprofessional interaction. Occupational therapy programs at other institutions may benefit from embedding a CLL into the curriculum to meet the needs of the community while improving students' clinical reasoning and enhancing the ability to provide client-centered care.

Keywords

Experiential learning, clinical reasoning, comfort level, occupational therapy education

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ABSTRACT

Occupational therapy (OT) educators strive to design learning experiences to enhance OT students' clinical reasoning and promote preparedness for the complexities of clinical practice. Occupational therapy programs have collaborated with the Amyotrophic Lateral Sclerosis (ALS) Association and taken a novel approach to the development of interprofessional experiential learning through student-led ALS Caregiver Learning Labs (CLLs). A retrospective pre-test post-test study was completed to identify outcomes related to participation in three different ALS CLLs embedded into a master's level OT curriculum. A 6-point rating scale questionnaire was used to assess students' perception of their clinical reasoning, clinical skills, and comfort level. Improvement was noted in the level of comfort when interacting with caregivers and students' perceptions of their clinical skills and clinical reasoning improved across all questions. In addition, students completed a case study assignment to examine clinical reasoning performance. On average, post-lab scores were higher than pre-lab scores for each question, and the differences were statistically significant with the level of significance at $p < 0.05$. Results suggest that a CLL experience is an effective learning method to increase students' comfort level interacting with caregivers, enhance students' perception of clinical reasoning ability, and improve clinical reasoning skills. Occupational therapy students benefited from the experience at different levels of progression, delivery methods, and opportunities for interprofessional interaction. Occupational therapy programs at other institutions may benefit from embedding a CLL into the curriculum to meet the needs of the community while improving students' clinical reasoning and enhancing the ability to provide client-centered care.

Introduction

Entry-level occupational therapy (OT) clinicians need to be skilled in providing client-centered care in a rapidly changing healthcare system. The demands of present OT practice require a clinician to utilize evidence-based practice and understand the complexity of each patient. Students need opportunities to develop clinical reasoning to prepare them for practice, and they often express a desire for more hands-on learning experiences with direct client contact (Goldbach & Stella, 2017). Therefore, OT educators must continue to evolve their teaching strategies as they strive to foster the development of clinical reasoning skills and prepare students to provide client-centered care and positive outcomes.

Experiential learning methods may be used by OT educators to promote skill development (Phillips, 2017). Experiential learning is an active process in which a student formulates knowledge, improves skills, and makes connections to real-life experiences (Knecht-Sabres, 2013). This hands-on learning process provides students with increased confidence levels and opportunities to build on classroom knowledge (Alanazi et al., 2017). The effects of experiential learning are well-documented in the educational literature, but there are limited studies completed on experiential learning techniques within graduate-level OT programs (Coker, 2010; Kolb, 2015). Currently, research indicates that experiential learning leads to increased critical thinking and preparedness for fieldwork (Goldbach & Stella, 2017). Occupational therapy educators have implemented experiential learning opportunities with clients from the community resulting in improved clinical reasoning and development of professional skills (Benson et al., 2013; Coker, 2010). These hands-on opportunities allow students to practice learned skills before engaging in actual clinical practice and experiential learning labs embedded in occupational therapy curriculum can help “bridge the gap between the classroom and the clinic” (Benson et al., 2013, p. 56; Knecht-Sabres, 2013, p. 32).

The translation of knowledge into practice for clinical reasoning during assessment, intervention, and when educating patients and caregivers is essential. Caregiver education is especially critical when families are coping with a devastating degenerative disease such as amyotrophic lateral sclerosis (ALS). As an individual with ALS becomes more dependent, family members often need to serve as primary caregivers and caregiver burden becomes a significant concern (Schischlevskij et al., 2021). Caregivers report many needs including support and education related to equipment and home modifications (Galvin et al., 2018). The world population of individuals diagnosed with ALS has been projected to increase by 69% between 2015 and 2040 primarily due to the aging of the population (Arthur et al., 2016). Thus, the need for patient and caregiver education will grow significantly in the upcoming years. The American Occupational Therapy Association’s [AOTA] Vision 2025 (2017) promotes a client-centered, holistic approach to optimize quality of life. This vision includes using an interprofessional approach to enhance participation in daily living and focuses on the use of evidence-based practice to facilitate the collaboration between the client, healthcare professionals, and their environment (AOTA, 2017). Entry-level OTs need to be able to collaborate and meet the evolving needs of patients and caregivers, therefore it is paramount for students to apply clinical reasoning skills with confidence when

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interacting with ALS caregivers. Interprofessional student-led Caregiver Learning Labs (CLLs) have been implemented in one midwestern state to meet the needs of informal caregivers. These ALS CLLs have been found to be beneficial to patients and caregivers (Hoey et al., 2020). However, no research has been completed to determine the OT student response to this novel form of experiential learning and the impact of these experiences on clinical reasoning.

Literature Review

Experiential Learning in Occupational Therapy Curriculum

The AOTA described the philosophy of OT education as using a collaborative approach through active and engaging participation in multiple learning contexts to build knowledge, evaluate skills, and continually self-reflect (AOTA, 2018). Experiential learning is an active hands-on process in which a student formulates knowledge, improves skills, and acquires value from his or her own real-life experiences (Knecht-Sabres, 2013). Occupational therapy students have reported experiential learning as being the most beneficial aspect of their didactic education (Knecht-Sabres et al., 2013). In addition, when asked to assess instructional methods educators reported experiential learning as the most beneficial with a 96.7% rating (Henderson et al., 2017). The instructor establishes an environment and provides just enough structure to help students make connections. “The real-life experience supports the development of skills, reinforces academic knowledge, facilitates the clinical reasoning process, and develops self-confidence” (Bensen et al., 2013, p. 56).

Experiential Learning: Clinical Reasoning

Schell defined clinical reasoning as “the process by which practitioners plan, direct, perform, and reflect on client care” (Schell, 2014, p. 384). A search of the literature yielded a limited number of studies examining student improvements in clinical reasoning following experiential learning with real patient interactions. Coker (2010) examined an experiential learning opportunity utilized in a master’s level OT program. Following one-week experiential learning activities with pediatric clients, students were found to demonstrate improved clinical reasoning (Coker, 2010). Flowers and colleagues (2020) also reported positive results as physical therapy students that completed pediatric experiential learning activities were found to have increased clinical reasoning and self-efficacy regardless of the amount of experiential learning exposure. Benson and colleagues (2013) found experiential learning embedded in a didactic course to be an effective step in the development of interactive reasoning and client-centered interactions. Knecht-Sabres (2013) provided experiential learning opportunities for OT students interacting with volunteer clients in their own homes. This was found to improve client-centered practice, contribute to students' increased self-confidence and skill set, improve the understanding of person, occupation, and environment, and enhance clinical reasoning skills (Knecht-Sabres, 2013). The literature presents experiential learning embedded in the OT curriculum as an effective way to facilitate enhanced clinical reasoning skills, which is essential for Level II fieldwork and entry level OTs.

Experiential Learning: Preparedness

Common inadequacies among OT fieldwork students include communication and documentation skills, confidence, and clinical reasoning (Goldbach & Stella, 2017). Occupational therapy students often report an increase of anxiety before client interactions due to fear of making a mistake, but students participating in experiential learning labs demonstrate an improvement in tolerance to ambiguity and an increase in confidence (Knecht-Sabres, 2013; Murphy et al., 2017). Students became more autonomous in completing occupational profiles, client interactions, and executing interventions. The experiential learning opportunities facilitate the development of communication skills enabling OT students to ask appropriate, individualized questions to address the values and needs of the client (Knecht-Sabres, 2013). Students participating in hands-on learning opportunities have also been found to increase feelings of preparedness for fieldwork (Goldbach & Stella, 2017). Further, experiential learning is vital in bridging the gap between new graduates and competent clinicians, as competence and confidence are closely related (Hodgetts et al., 2007; Thomas et al., 2017).

Developing an Effective Experiential Learning Opportunity

Preparation

Planning and developing successful experiential learning activities involves attention to key components: preparation, facilitation of reflection, and encouraging interprofessional interaction. The educator designing experiential learning opportunities should establish structure and objectives to promote student involvement while providing clear expectations (Hutchinson & Smilovitch, 2016). The educator further needs to consider curriculum design and topic sequence, so the student has enough prior learning to make each new experience meaningful (Cattaneo, 2017). Introducing skills prior to the implementation of experiential learning can facilitate a more successful learning experience for students and training allows students to analyze material before applying acquired knowledge. Occupational therapy educators report value in experiential learning as an educational method, indicating that it is beneficial to create a safe environment, model learned skills, and choose meaningful active teaching methods when designing experiential learning opportunities (Henderson et al., 2017).

Reflection

Experiential learning with guided reflection is a valuable tool in helping students prepare for holistic, client-centered interactions (Benson et al., 2013). According to Schön (1987), hands-on learning experiences are enriched through abundant opportunities for both “reflection on action” and “reflection in action.” Reflection in action requires evaluation of a situation to overcome some obstacle while engaged in the activity (Johns, 2017). An experienced clinician reflects continually during client interaction, naturally responds to each individual situation, and may shift intervention techniques to be more effective (Johns, 2017). Students with less practical experience may benefit from experiential learning opportunities to take a time out and process during a hands-on activity with the guidance of an experienced practitioner. Increased sharing of reflection in action helps students transition from focusing on memorizing content to

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becoming more aware of the process of thinking and problem solving, and reflection in action guided by the instructor can deepen student understanding of context and complexities of practice (Benson et al., 2013; Cant & Cooper, 2011; Johns et al., 2017). Reflection on action can be described as the careful consideration of an experience that has occurred. Johns (2017) provides a model for structured reflection that guides individuals through the process of reflection on action which includes: describing the experience, identifying why responses occurred, considering the effectiveness of action, and contemplating insights from the experience. A reflection or debriefing can be utilized to examine student performance and instructor facilitated reflection enables students to integrate knowledge and recognize how the learning can be applied to other practice settings (Johns et al., 2017) Through guided reflection students recognize their strengths and needs, thus allowing their lab experiences to focus on professional development (Benson et al., 2013). Occupational therapy students participating in experiential learning with standardized patients find debriefing to be beneficial and similarly, educators find it to be a vital aspect of the learning process (Cant & Cooper, 2011; Henderson et al., 2017; Walls et al., 2019).

Interprofessional Educational Experience

Interprofessional learning is also an important consideration in healthcare education. AOTA recommends that all entry-level OT students have the opportunity for interprofessional education (IPE) so they can apply the skills needed for collaborative work (AOTA, 2015). Interprofessional education involves students from two or more professions collaborating with and learning from each other to improve patient care (World Health Organization [WHO], 2010). Positive outcomes from IPE experiences include improved networking, opportunities for learning from each other, and an enhanced understanding of multidisciplinary roles within the healthcare team (Christie et al., 2021). Students also report a perception of increased preparedness for interprofessional interactions in future clinical settings (Jernigan et al., 2016). Collaborating with other disciplines offers students a different perspective, expanding clinical reasoning skills to promote client-centered care. Student-led Caregiver Learning Labs are a unique form of experiential learning that offers the opportunity for collaboration and interprofessional interaction while meeting the needs of caregivers in the community.

ALS Caregiver Needs

Amyotrophic lateral sclerosis (ALS) is the progressive, rapid, deterioration of motor neurons leading to motor neuron death; thus, causing the inability of the brain to initiate and regulate movement influencing one's ability to eat, speak, walk, and breathe (ALS Association, n.d.). The average lifespan after an ALS diagnosis is three to five years, however, some individuals can survive ten years or more (ALS Association, n.d.). Patients with ALS oftentimes become fully dependent on a caregiver for tasks such as eating, transfers, and medical care and in many cases, family members assume the caregiver role, despite not having any formal training (Galvin et al., 2018). Caregivers of persons with ALS experience high levels of burden and the increased burden is associated with the duration of caregiving as functional status declines and the disease progresses (Schischlevskij et al., 2021).

Caregivers have identified their greatest needs as education and training specifically related to assistive devices, home modifications, resources, and expectations for the future (Aoun et al., 2017; Galvin et al., 2018). Kavanaugh and colleagues (2020) provided multidisciplinary hands-on training for youth caregivers noting improved confidence and skill levels for the teens (Kavanaugh et al., 2020). Young caregivers reported learning how to complete skills safely that had previously been performed incorrectly. There are limited opportunities for hands-on training sessions available to caregivers that address learning skills related to care during daily living tasks and there is a need for more evidence addressing the efficacy of caregiver training (Kavanaugh et al., 2020).

Caregiver Learning Labs (CLL) were developed through collaboration with the ALS Association Iowa Chapter to meet the needs of the caregiver. The learning labs consisted of stations, which were student-led with faculty supervision. Caregivers and patients cycled through each station and had the opportunity to observe or practice hands-on skills. Examples of stations included Hoyer lift, vehicle mobility, safe transfers, high-tech communication, and feeding strategies. In the spring of 2018, caregivers participated in CLLs hosted by three different OT programs. A six-month follow-up survey was completed and all the stations were perceived as having a moderate or high benefit for caregivers and a majority of the caregivers reported feeling more prepared (Hoey et al., 2020).

Purpose of Study

The CLLs were also designed to meet the learning needs of healthcare students. The labs provided a unique opportunity for students to demonstrate practical applications of information learned in lectures with hands-on opportunities to practice using assistive technology and interact with caregivers. The value of experiential learning is accepted as being beneficial within the literature, as it can promote clinical skills and clinical reasoning (Bennett et al., 2017; Coker, 2010; Knecht-Sabres, 2013). Student-led interprofessional CLLs provided for informal caregivers are a novel form of experiential learning, and student outcomes related to this type of experiential learning have not been examined. The purpose of this study was to investigate how participation in an ALS CLL influences OT students and to address the gap in the literature regarding experiential learning caregiver interaction opportunities for OT students. The following research questions guided the study:

1. How does participation in a CLL affect student comfort level with caregiver interaction?
2. How does participation in an ALS CLL influence student perception of clinical skills and clinical reasoning?
3. Does participation in a CLL improve the clinical reasoning skills of OT students?

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Methods

Research Design

This retrospective pre-test, post-test quantitative study examined student outcomes related to participation in CLLs. A final open-ended question on the post-test provided qualitative information. The College Institutional Review Board (ACIRB) reviewed and approved the study and the Dean of Health Sciences provided a letter of cooperation.

Participants

This study included a convenience sample of 63 OT students enrolled in an entry-level Master of Science in Occupational Therapy (MS in OT) program located in the Midwest. Students were from three cohorts in a full-time, year-round, 27-month program. The sample size was determined based on three cohorts that participated in the ALS CLL between March 2019 and March 2021 within the program of interest. The CLL was embedded in various semesters of the OT curriculum. Student participants in the fall of 2020 (n=18) were in their first semester of the program while the other participants were in the final semester of their didactic coursework.

Caregiver Learning Lab Procedure

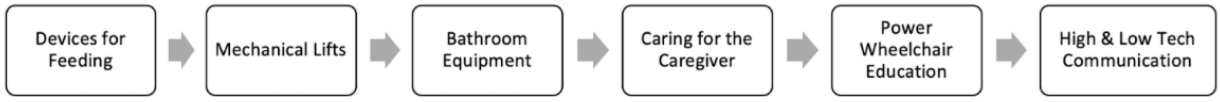
Three separate CLL events were facilitated by the MS in OT program students and faculty during March 2019, November 2020, and March 2021 in collaboration with the ALS Association Iowa Chapter. Prior to developing content for each lab, the students completed didactic coursework to deepen their understanding of ALS. This education was supplemented through a presentation by a representative from the ALS Association for the 2019 and 2021 cohorts.

Each cohort of students was subdivided into smaller groups of three to four students. One student from each group was assigned to a caregiver to guide them through the stations. The remaining students were randomly assigned to their training stations. Students developed content and presented hands-on educational opportunities to caregivers.

The caregivers that participated in the event were able to register via a sign-up through the ALS Association. The learning labs began with the students performing an interview with the caregiver to identify their needs. Next, the caregivers were taken through each student-led station (see Figure 1). The caregivers spent approximately 20-30 minutes at each station and when in person, had the opportunity for hands-on interaction. Upon completion of the CLL, the students participated in a group debriefing session and then completed their post-survey and case study assignment.

Figure 1

Examples of Student-led Stations at CLL



There were some variations in the design of the CLL due to the pandemic. This required two of the cohorts to perform the CLL virtually, while prior to the pandemic, the CLL in the spring of 2019 was face-to-face. The ALS CLLs held in spring 2019 and 2021 were interprofessional and student-led by second-year OT students in collaboration with other professions such as speech-language pathology (SLP), respiratory therapy (RT), social work (SW), and nursing students to provide education and training. The ALS CLL held in the fall of 2020 was not interprofessional due to the pandemic and was facilitated by faculty and first-year OT students.

Table 1

Variations in Caregiver Learning Labs

Year	Spring 2019	Fall 2020	Spring 2021
Context	In-person	Virtual	Virtual
Interprofessional	Yes	No	Yes
Professions Involved	OT, SLP, SW, Nursing	OT	OT, SLP, RT
Semester of MSOT	5th	1st	5th

Outcome Measures

Outcome measures were originally developed to assess student learning related to the CLL and to obtain data to utilize for continuous quality improvement (CQI) information to guide the implementation of future labs. A pre-test post-test questionnaire was developed by the primary researcher based on an outcome measure developed by Knecht-Sabres (2010). Knecht-Sabres (2010) utilized a questionnaire to assess student perception of clinical skills and clinical reasoning after achieving face validity of the tool through feedback from other faculty members. The primary researcher of the current study modified the questions to better relate to caregiver interaction. The pre-test was reviewed by faculty members and a practice expert and then piloted through OT students participating in an experiential learning opportunity with a patient and his caregiver. The questions were then revised to include nine questions on a six-point rating scale to assess the perception of clinical reasoning/clinical skills, and comfort level of students prior to the intervention. The post-test (see Appendix) consisted of the same nine questions and also included an opportunity for students to provide comments.

A written case study with four open-ended questions was administered pre-lab. Then, students were asked to make additions/corrections to their answers following each lab experience. Modification of the case study was required for first-semester students during the fall of 2020. The case studies were designed to meet the learning objectives for the lab and feedback was obtained from OT faculty for revision. The instructor

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utilized a rubric to assess student knowledge and clinical reasoning. This rubric was then modified to be used for first-semester students during the fall of 2020. The following are example questions asked within the case study: “(1) What considerations will help you provide client-centered intervention? (2) What questions would you ask of the caregiver to help determine the needs of the patient and caregiver?”

Data Collection Procedures

Due to the nature of a retrospective study, informed consent was not obtained. A waiver of student consent was requested and approved by the IRB to apply the data to the research questions. Students involved had no risk as all outcome measures were de-identified.

Data Analysis

Data was analyzed through a comparison of the pre-test and post-test of questionnaires and case studies for each CLL event. Statistical Package for the Social Sciences (SPSS) v.27 was the software utilized to analyze ordinal data. Non-parametric tests were used to make comparisons between the pre- and post-lab experiences. Members of the research team worked on an individual basis and in pairs to identify significant statements and potential themes from the comments provided on the open-ended post-test question. Researchers then came together to establish final themes and choose quotations to be utilized as supporting data.

Results

Student Perception: Comfort Level

All participants completed a pre-test and post-test questionnaire indicating their perceptions of their comfort level with caregiver interaction and their perception of their clinical reasoning skills. Students were asked to rate comfort on a scale of one to six with one described as “not comfortable” and six as “very comfortable”. The results from the pre-test and post-test from question one are summarized in Figure 2. Improvement was noted in the level of comfort when interacting with caregivers and overall, mean ratings improved from 4.25 to 5.33 and individual cohorts each demonstrated mean rating improvements.

Student Perception: Clinical Skills and Reasoning

As shown in Figure 3, students' perceptions of their clinical skills and clinical reasoning improved across all eight questions for the three cohorts. Student perception of their ability to perform OT hands-on caregiver education was found to have the greatest increase with a pre-test mean rating of 3.84 and a post-test mean rating of 4.93. The ability to perform an OT profile and assessment and the ability to understand the nature of the condition and its impact on performance skills were found to have the second-largest change in mean ratings (see Figure 3). Further, student perceptions of their clinical skills and clinical reasoning were also analyzed by cohort and improvements were noted on each question. Cohort 2020 demonstrated the largest difference between pre-test and post-test mean differences across all questions.

Figure 2

Level of Comfort Interacting with Caregivers

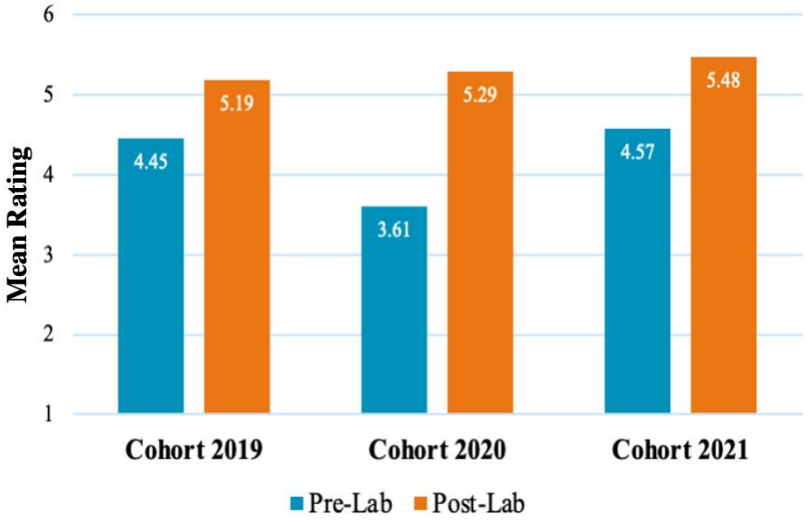
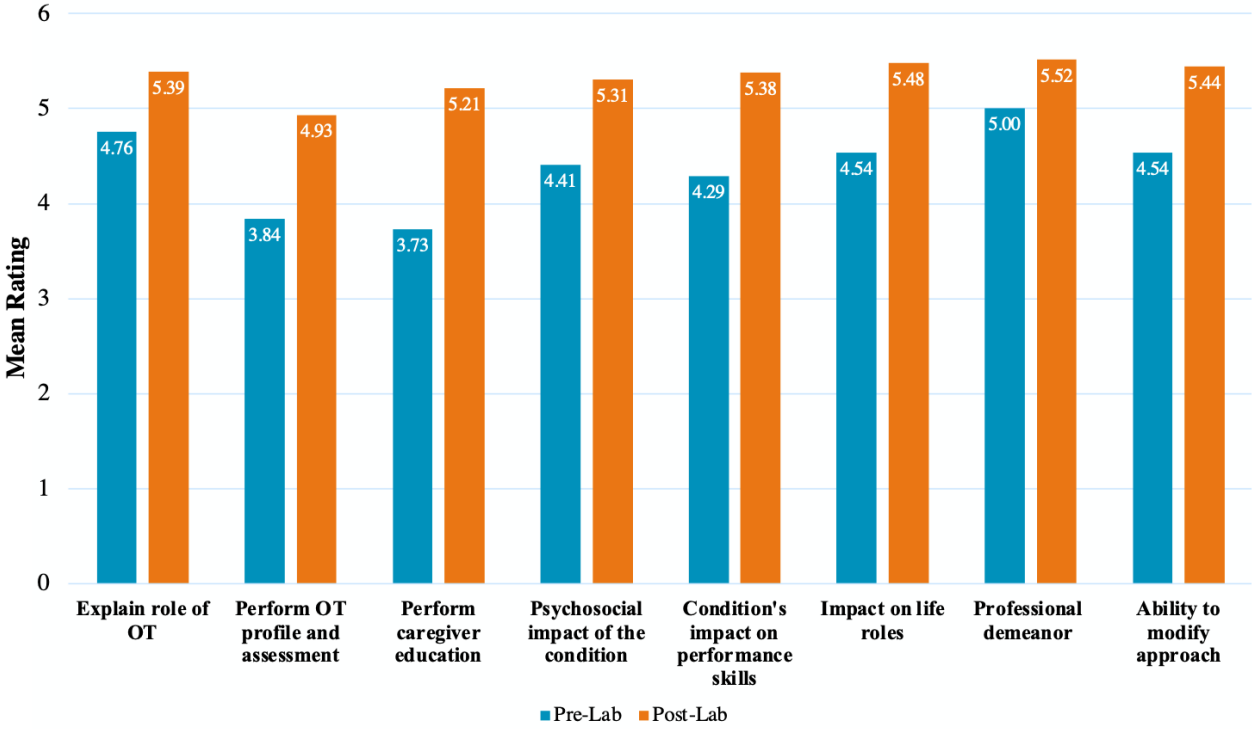


Figure 3

Student Perception of Clinical Skills and Clinical Reasoning



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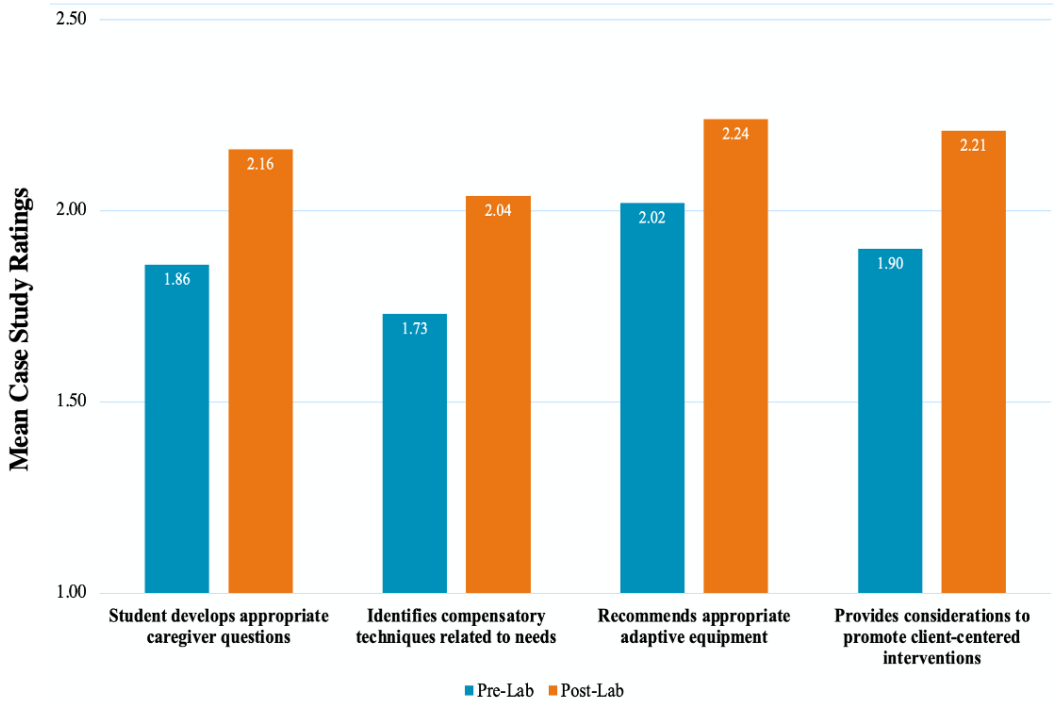
Clinical Skills and Reasoning: Case Study

Students completed an ALS case study prior to the lab and made modifications and/or additions to the case study responses following the CLL. The case study was graded by the course instructor and each student received a rating (1= “needs improvement”, 2= “meets expectations", 3= “exceeds expectations"). A Wilcoxon matched-pair signed-rank test was computed to compare the pre-lab and post-lab scores for each question. This nonparametric test compares the median difference to the hypothesized difference. On average, post-lab scores were higher than pre-lab scores for each question, and the differences were statistically significant assuming the level of significance is set at $p < 0.05$ (see Figure 4).

Figure 4

OT Student Clinical Reasoning Skills: Case Study Performance



The effect sizes are medium to large according to Cohen's effect size classifications (0.1 = small, 0.3 = medium, ≥ 0.5 = large). Questions one and four presented with the highest level of statistical significance ($p < .001$) and effect sizes of .52 and .55, respectively. The greatest overall growth was demonstrated when providing considerations to promote client-centered intervention (0.31 difference in mean case study ratings).

A further analysis was completed to investigate student case study results by each cohort. Cohorts 2019 and 2021 completed all of the case study questions, while cohort 2020, in their first semester of the program, only completed questions one and four. Statistically significant differences in case study performance were demonstrated by

students in cohorts 2020 and 2021 on all questions ($p < 0.05$) with a moderate to large effect size. Cohort 2019 demonstrated statistically significant differences on questions two through four ($p < 0.05$) and a moderate to large effect size.

Themes of Comments

Students had the opportunity to provide comments about their CLL experience on question ten of the post-test survey. Four themes emerged from the analysis of this qualitative information including positive learning experiences, continuous quality improvement recommendations, the development of empathy through patient interactions, and improved clinical reasoning skills (see Table 2).

Positive Learning Experience

The most common theme identified among participants was a positive experience while completing the CLL. One participant's statement reflected on this opportunity regarding their exposure to the diagnosis of ALS, "I really enjoyed this lab… I have never had a personal experience with ALS and this helped me understand the diagnosis much better." Another participant reported, "Great learning experience and loved the chance to meet members of the community that found benefit in this programming!".

Continuous Quality Improvement Recommendations

Students reflected and provided comments for improvement of future learning labs relating to time spent at each station and additional preparation prior to lab. Students also recommended sending caregivers a pre-survey to better identify their needs preceding the lab. One student recommended, "It would have been beneficial if something could be done to really understand the caregiver's needs so we can make sure we are giving them beneficial information."

Improved Clinical Reasoning

Clients presented with different stages of the diagnosis and resided in different contexts. Therefore, clinical reasoning was important to ensure each caregiver's needs were appropriately met. After leading the CLL students reported a better understanding of the diagnosis allowing them to use clinical reasoning and adapt to each unique case. The following statement represents comments provided by students after interacting in a real-life situation, "It challenged me to adapt the station's content to the needs of the caregiver/patient."

Development of Empathy

Students recognized the importance of building rapport with clients and felt that they gained empathy through learning from the client/caregivers' personal stories. The following statement depicts how this learning activity facilitated growth and development in this area: "It was interesting and touching to be able to see into a part of someone's life that is so personal and has such a large effect on them, but it felt so rewarding to provide them information to support them and help them with difficulties."

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Table 2

Student Comments Following ALS Caregiver Learning Lab Experience

Themes	Example Quotes
Positive Learning Experience	"I really enjoyed this lab…I have never had a personal experience with ALS and this helped me understand the diagnosis much better."
	"Great learning experience and loved the chance to meet members of the community that found benefit in this programming!"
	"I loved this experience and learning about all the caregivers and their story."
CQI Recommendations	"It would have been beneficial…to really understand the caregiver's needs so we can make sure we are giving them beneficial information."
	"It would be beneficial to have the caregivers choose ahead of time which stations they were most interested in."
Improved Clinical Reasoning	"It challenged me to adapt the station's content to the needs of the caregiver/patient."
	"I really had to adjust my approach…"
	"I grew in my communication with the caregivers and learning how to tailor the information to the needs in each situation."
Development of Empathy	"It was interesting and touching to be able to see into a part of someone's life that is so personal and has such a large effect on them, but it felt so rewarding to provide them information to support them and help them with difficulties."
	"It was nice to finally be able to talk with and connect with people who are effected by the disease to really see how it an effect the lives of not only them but everyone around them."

Discussion

Student Perception

The pre-test and post-test questionnaire data demonstrated that participation in a CLL improved students' comfort level with caregiver interaction. This improvement was present when looking at the aggregate data for all students and when examining each individual cohort. These results support the current literature identifying experiential learning as an effective teaching method to enhance comfort level among students (Ivey et al., 2018; Lim et al., 2018; Thomas et al., 2017; Quail et al., 2016).

Occupational therapy students participating in an ALS CLL demonstrated an improved perception of their clinical skills and clinical reasoning across all questions. The greatest improvement perceived in clinical skills was in the students' ability to perform caregiver education and conduct an initial OT profile and assessment on the client. These are essential skills for the students as they transition to Level II fieldwork and entry-level practice. The students also identified improved perception of clinical reasoning through a better understanding of the condition and its impact on performance skills and life roles. These results support similar findings from Coker (2010) and Knecht-Sabres (2013) in that participating in an experiential learning opportunity helps to apply classroom learning and improves students' perception of clinical skills and their clinical reasoning abilities.

Cohort 2020 demonstrated the largest difference among the cohorts in the level of comfort and perception of clinical skills, which is most likely due to participating in the learning lab during their first semester whereas cohorts 2019 and 2020 were in their fifth semester of the MS in OT program. Students early in the progression of the curriculum have had less opportunity for learning and patient or caregiver interaction.

Student Feedback

Common themes established from the students' post-survey comments provided additional insights into the benefits of the CLL. These themes included: positive learning experience, clinical reasoning, reflection and modification recommendations, and development of empathy. Overall, the students reported that they enjoyed the CLL and felt it was a beneficial way to learn to modify their interactions and problem-solve for the caregiver's individual needs. One student commented, "So glad I had the opportunity. I feel much more confident about being in the OT role and communicating with caregivers." Participation in the CLL allowed students to practice clinical reasoning skills and encouraged them to adapt to each unique situation. This level of problem-solving helps students develop confidence and promotes skills necessary for client-centered practice.

Students demonstrated the ability to reflect and identify process improvement recommendations for future CLLs. This feedback has been used to make continuous quality improvements to each CLL offered to the community. Reflecting on action is a valuable skill that students can utilize in entry-level practice to analyze performance and improve caregiver and patient interactions.

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Empathy was a final unexpected theme established from the student comments which is a beneficial skill to develop when working with vulnerable populations. Feelings of empathy developed through interactions with caregivers contributed to valuable conversations during the debriefing process of the CLL. The ability to understand and share the feelings of others is a genuine response that may not be elicited as effectively through didactic learning activities.

Clinical Reasoning: Case Study Performance

In addition to student perception of their skills, it is valuable to gain information about outcomes related to student performance following participation in a CLL. Participating students completed either two or four case study questions based on the progression of the cohort in the program. The combined cohorts demonstrated a statistically significant improvement in case study scores after the completion of the CLL. The effect sizes of all items were medium to large according to Cohen's effect size classifications, indicating the difference between the pre-lab and post-lab are clinically relevant. Students' greatest growth was in the ability to identify compensatory techniques related to the caregivers' needs. There was also large growth seen in the ability to provide considerations to promote client-centered interventions and the ability to develop appropriate questions for the caregiver. This demonstrated the wide range of skills that may be gained from learning labs. These findings support previous studies in which experiential learning opportunities were found to improve overall clinical reasoning skills necessary to become a successful healthcare professional (Coker, 2010; Falk-Kessler et al., 2007; Flowers et al., 2020; Giesbrecht et al., 2020; Knecht-Sabres, 2010).

When considering individual cohorts, students from cohorts 2020 and 2021 demonstrated statistically significant improvements across all case study questions, and cohort 2019 students demonstrated a statistically significant improvement on all questions except for one. Each CLL had unique characteristics. For example, the 2019 CLL was completed face-to-face, while the next two labs had virtual components due to the pandemic. The opportunities for interprofessional interaction also varied and in 2021 respiratory therapy students were added to the event. Minor variations also occurred in the student-led stations as a high-technology station was added to address personal device access in 2021. Regardless of program progression, learning platform, and level of interprofessional participation, students demonstrated post-lab ratings with a statistically significant improvement compared to pre-lab ratings for the case study questions. This provides evidence to support the implementation of ALS CLLs as an effective method to enhance student performance and clinical reasoning learning outcomes.

Implications for Occupational Therapy Education

Student-led CLLs have been found to be beneficial for both caregivers and patients among the ALS population (Hoey et al., 2020). In addition, evidence from the current study supports the development of CLLs to increase OT students' comfort level, perception of skills, and clinical reasoning performance. Currently, Iowa is the only state in the nation implementing student-led ALS CLLs. Occupational therapy programs at other institutions may benefit from integrating a CLL into their curriculum to support education and meet the needs of community members.

The results of this study can also be utilized to highlight best practice methods for embedding CLLs into the OT curriculum. Recommendations include education and training prior to the event and the use of guided reflection or debriefing following participation in the hands-on learning (Cant & Cooper, 2011; Cattaneo, 2017; Thomas et al., 2017). CLLs may also provide opportunities for interprofessional collaboration which is another valuable aspect of OT education. AOTA's Vision 2025 inspires the use of evidence-based practice to facilitate the collaboration between the client, healthcare professionals, and their environment (AOTA, 2017). Occupational therapy educators have the opportunity to collaborate with community organizations like the ALS Association to better meet the needs of patients and caregivers while providing opportunities for students to build clinical reasoning skills. Understanding the results of this study could be powerful evidence to promote the success of future healthcare practitioners and to improve client-centered service delivery.

Limitations

The study utilized data collected from the ALS CLL which was conducted in a rural, Midwest region, and used a convenience sample that cannot be generalized to other educational settings across the nation. Another limitation of this study was the small sample size. Each CLL offered unique characteristics; program progression, learning platform, and opportunity for interprofessional participation, and these variations may limit generalizability. The CLLs were also delivered for caregivers of the ALS population thus, findings cannot be generalized to other conditions or populations.

Future Research

Future research corresponding to this study could include developing and investigating the outcomes related to ALS CLL implementation in other OT programs. A larger sample size would allow for more generalization and could potentially increase the reliability of the findings. Using the ALS CLL as a model, future researchers may serve different populations and investigate the effectiveness of experiential learning opportunities across various diagnoses. Student outcomes related to interprofessional interactions, and the understanding of various healthcare professional roles may also be valuable to explore. Further investigation may also include a follow-up with student participants to examine if the experiential learning opportunity impacted their success in fieldwork and/or their work as entry-level clinicians.

Conclusion

The results of this study support the continued expansion of student-led CLLs. These unique experiential learning opportunities have been found to improve OT students' comfort level and enhance clinical reasoning skills while meeting the needs of the community. Occupational therapy students gained essential skills while providing valuable caregiver education and client-centered care as they prepare for a future in complex healthcare environments.

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Appendix A
ALS Caregiver Learning Lab Survey

1. Level of comfort interacting with caregivers.

   Not comfortable 1 2 3 4 5 6 Very Comfortable

2. Ability to explain the role of OT.

   Unable 1 2 3 4 5 6 Very well

3. Ability to perform occupational therapy profile and assessments.

   Unable 1 2 3 4 5 6 Very well

4. Ability to perform occupational therapy hands-on caregiver education.

   Unable 1 2 3 4 5 6 Very well

5. Ability to understand the psychosocial impact of an illness or condition.

   Unable 1 2 3 4 5 6 Very well

6. Ability to understand the nature of the condition and the impact on performance skills (motor skills, process skills, and social interaction skills).

   Unable 1 2 3 4 5 6 Very well

7. Ability to understand the nature of the condition and the impact on life roles.

   Unable 1 2 3 4 5 6 Very well

8. Quality of your professional demeanor when interacting with caregivers (good eye contact, uses appropriate language, displays confidence etc.)

   Poor 1 2 3 4 5 6 Excellent

9. Ability to use oneself therapeutically and modify one's approach based on the caregiver's presentation and/or affect.

   Poor 1 2 3 4 5 6 Excellent

10. Please provide any comments you have about the ALS Caregiver Learning Lab.[1]

[1] Pre-survey did not include question 10.