

ORIGINAL RESEARCH ARTICLE

COVID-19 and shortened integrated clinical experiences: impacts on acute care confidence and interpersonal communication

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Abstract

Purpose: Many doctor of physical therapy (DPT) programs limited student clinical experiences, including integrated clinical experiences (ICEs), in 2020 due to the restrictions of coronavirus disease 2019 (COVID-19) pandemic, without knowing how the abbreviated clinical exposure would influence student perceptions of psychomotor and interpersonal communication skill development. The purpose of this study was to determine if fewer ICEs resulted in a difference in acute care confidence or interpersonal communication skills for DPT students.

Methods: Two cohorts of DPT students completed surveys aimed to measure acute care confidence (Acute Care Confidence Survey [ACCS]) and interpersonal communication skills (Interpersonal Communication Questionnaire [ICQ]) pre- and post- ICE. Students in one of the cohorts completed half of their second ICE experience because of unexpected curricular changes, effectively decreasing their ICEs by 25%. Data was analyzed using paired *t*-tests and two-way repeated measures ANOVAs.

Results: There was a significant interaction on ACCS and ICQ by time. Students gained an average of approximately 440 points on the ACCS and 4.9 points on the ICQ over the course of both ICEs. However, there was not a statistically significant difference between cohort and either acute care confidence or interpersonal communication.

Conclusion: Curricular changes resulting in fewer ICEs did not appear to significantly influence student confidence in the acute care environment or with interpersonal communication skills. Students gained self-confidence in acute care practice and improved communication skills when involved in hands-on ICEs. These improvements were not seen during portions of the curriculum that did not involve inpatient experiences.

Keywords: *integrated clinical experiences; acute care confidence; psychomotor skill; affective domain; readiness for full-time clinical education*

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To access the supplementary material, please visit the article landing page

Doctor of physical therapy (DPT) programs employ components of didactic and clinical education to prepare students for entry-level practice. Although the structure and timing of didactic and clinical components within a curriculum varies between programs, traditionally the bulk of the clinical education experiences are placed after the conclusion of didactic content, in the latter half of the DPT program. However, research indicates that early exposure to patient care can provide students with the psychomotor and affective skills necessary for practice, reinforce didactic content, and promote opportunities for professional growth.^{1,2} Clinical

education provides the space for the integration of background knowledge, theory, psychomotor skills, clinical reasoning, and decision-making.^{1,3,4,5}

Integrated clinical experiences (ICEs) may also promote readiness for full-time clinical experiences.^{6,7} Readiness for full-time clinical education may be particularly important in the acute care environment, where students may not have extensive experience prior to entering their DPT program. DPT education must include both integrated and full-time clinical experiences for accreditation.⁸ ICEs are defined as clinical experiences that occur before the completion of the didactic component of the

curriculum and prior to the start of any terminal clinical experiences.⁸ Although ICEs are required, the optimal structure of ICEs and their effects on psychomotor and affective skill development have not been established. Experts advocate for the standardization of quality clinical education,^{9,10} but to date, no best practices for ICEs have been adopted. While ICEs appear to vary widely in structure, timing, and duration, contemporary DPT curricular models use ICE to promote experiential learning to reinforce the concepts and skills taught in the didactic curriculum.^{1-3,11-14} However, it remains unknown whether the unexpected shortening of these ICEs may negatively impact student skill development, particularly in the psychomotor and affective domains.

In March 2020, DPT programs made significant alterations in their curricula to accommodate shelter-in-place orders due to coronavirus disease 2019 (COVID-19). In many cases, this meant that programs unexpectedly shortened clinical experiences, including ICEs. A survey conducted by the National Consortium of Clinical Educators indicated that 91% ($n = 188$) of programs had students whose full-time clinical experiences were terminated or unable to begin because of the pandemic.¹⁵ Students therefore had less time for experiential learning and application of didactic content, but it was unknown whether this decrease in clinical time would impact students' skill development in the psychomotor and affective domains.

Providing students with adequate time in the acute care environment may be particularly pressing due to the increasing complexity of the environment, which requires students to quickly integrate affective, psychomotor, and cognitive skills to deliver safe and effective patient care.¹⁶ Yet, physical therapist educators realize the increasing capacity problems with the provision of student clinical education, especially in the inpatient setting.¹⁷ Ideally, programs would identify the optimal amount of time needed in ICE to develop student confidence in the provision of physical therapist services in the acute care environment. The primary purpose of this study was to determine whether a decrease in the number of ICEs resulted in a difference in acute care confidence or interpersonal communication skills for DPT students prior to full-time clinical experiences. A secondary purpose was to measure the changes in acute care confidence and interpersonal communication over the course of an ICE curriculum.

Methods

Data were retrospectively collected from two cohorts of DPT students enrolled in an urban, academic medical center from 2017 to 2020. Table 1 describes the measured demographic characteristics of the two classes, and there were no statistically significant differences between the two cohorts. Additional demographic measures, such as age, were not captured at the time of data collection.

Table 1. Demographic characteristics of ICE participants

| Characteristic | 2019 cohort | 2020 cohort | P-value |
|-----------------------|-------------|-------------|---------|
| | n (%) | n (%) | |
| Number of students | 36 | 38 | - |
| Gender | - | - | 0.60 |
| Male | 13 (36.1%) | 16 (42.1%) | - |
| Female | 23 (63.9%) | 22 (57.9%) | - |
| Students of color (%) | 6 (16.7%) | 11 (29.0%) | 0.21 |

The present study was exempted from review by the Institutional Review Board at the University of Texas Southwestern Medical Center in Dallas, Texas (Number STU2020-0369).

The students participated in two ICEs each that were incorporated into the second and sixth academic semesters of a DPT program (Fig. 1). The ICEs took place in clinics and hospitals associated with the medical center. For ICE 1, the students spent 4 half-day experiences, spaced 2 weeks apart, paired with clinical preceptors in acute care (two experiences), inpatient rehabilitation (one experience), and outpatient (one experience) settings. For ICE 2 in both cohorts, the students were scheduled to spend 6 half-day experiences with clinical preceptors in acute care (two experiences), inpatient rehabilitation (two experiences), and outpatient (two experiences) settings. Because the students had prior exposure to general outpatient orthopedics prior to ICE 2, the outpatient offerings in ICE 2 for the Class of 2020 (C2020) were offered in specialized settings both on and off campus, including pediatric outpatient sports, pulmonary outpatient, vestibular outpatient, and neurologic outpatient. The students could also choose to have their acute care or inpatient rehabilitation exposures for ICE 2 in pediatric settings off campus.

The COVID-19 pandemic resulted in social distancing measures on a national, state, local, and institution-wide level in the spring semester of 2020. For the institution of study, these measures impacted the planned ICEs for the C2020, resulting in students completing just half of the ICE 2 exposures that were scheduled. Thus, the C2020 completed at least one acute care, one inpatient rehab, and one outpatient exposure during ICE 2, apart from two students who completed one exposure each in an inpatient setting. On average, the C2020 had a total of three instead of four acute care experiences – a 25% reduction in total time in the acute care setting.

During ICEs, the students were engaged in hands-on practice and were required to complete a checklist of affective and psychomotor skills, which were derived from the objectives of DPT coursework in the same semester as their ICE experiences (see supplementary material). The checklists also incorporated several essential knowledge, skills, attitudes, and professional behaviors (KSAs)

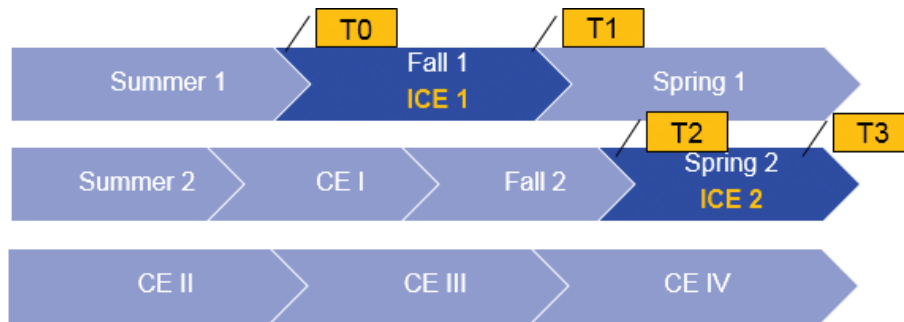


Fig. 1. Timing of the ICEs in the DPT Program and assessments (CE refers to full-time clinical experiences).

identified in a Delphi study as indicators of student readiness for their first full-time clinical education experience.^{18,19} The students were required to have each of the first three skills checked off during each ICE exposure and the remaining skills checked off at least one time during the ICE. The aim of the checklists was to assist the faculty in determining student readiness for first full-time clinical experiences, and normally all students are required to have 'Met' each skill on the checklist during the ICE curriculum. The completeness of these checklists was therefore a consideration in this study for all ICE participants, as it could foreseeably explain a discrepancy in acute care confidence or interpersonal communication skills between classes, if a difference existed. No additional major curricular changes took place during the study period that were likely to influence the results.

Because the acute care environment is highly dynamic and complex, students can have difficulty adapting during full-time clinical experiences, lacking confidence in their provision of care.¹⁶ ICEs provided the program of study a way to ensure student success in acute care during full-time clinical experiences. Confidence in patient management in the acute care environment was measured using the Acute Care Confidence Survey²⁰ (ACCS) and interpersonal communication was measured via the Interpersonal Communication Questionnaire²¹ (ICQ). The outcomes were assessed pre- and post-ICE 1 and pre- and post-ICE 2 for all students. The Class of 2019 (C2019) completed the ACCS and the ICQ at the conclusion of their Spring semester, while the C2020, due to concluding their ICE exposures early, completed the ACCS and ICQ approximately 1 month prior to the conclusion of the semester. The early administration of the surveys to C2020 was done to minimize the amount of time in between concluding ICE exposures and outcomes assessment. Relevant coursework regarding the skills on the ICE objectives checklists had been covered prior to students completing the outcomes measures post-ICE 2.

The ACCS is a 15-item questionnaire in which students rate, on a scale of 10 (very uncertain) to 100 (very certain), their level of confidence with performing psychomotor

and affective tasks in the acute care environment.²⁰ Scores are added for a possible range of 150 (very uncertain) to 1,500 (very certain). The instrument's structural and construct validity was established during development using a team of 11 physical therapists.²⁰ Test-retest reliability was excellent for all subscales when first piloted on DPT students in a full-time acute care experience (intraclass correlation coefficient [ICC]: 0.78–0.91).²⁰ Excellent reliability was also found when tested with 66 DPT students on full-time acute care clinical experiences ($r = 0.83$, $P < 0.0001$).²² In this cohort of students, higher scores were correlated with more experience in full-time clinical education ($r = 0.37$, $P = 0.003$) and the number of hours of acute care exposure ($r = 0.28$, $P = 0.02$).²² The average number of hours in acute care prior to the experience in the cited study was 17.5, with a range of 0–3,200, as compared with an average of 134.4 h with a range of 0–5,049.

The ACCS had excellent internal consistency for the full scale, as determined by a Cronbach alpha of 0.9, though there was low to moderate correlation between the ACCS and CPI at mid-term.²⁰ Further, the ACCS was found to have overall internal consistency of 0.92.²² There have been inconsistent findings for the internal consistency among the sub-scales of the ACCS.^{20,22} For this reason, we decided to only interpret the ACCS as a whole and caution that internal consistency may not be as high for students in the present study who undergo 3 or 4 half-day experiences.

The ICQ was previously tested on the two cohorts of students to measure their self-perceived interpersonal communication skills pre- and post- patient simulation,²¹ and it has also been shown to detect differences between students who had worked as an aide and those who had not.⁶ The tool has been shown to detect differences for students who did and did not have ICE experiences.⁶ The ICQ consists of eight statements to which students state their level of agreement on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree).²¹ It includes two sub-scales that further measure communication abilities in a clinical environment – Confidence and Anxiety. Four items (three in the Confidence sub-scale and one

in the Anxiety sub-scale) were to be reverse-scored, and thus were re-coded prior to analysis. Sub-scale scores range from a possible 4 to 20 points each, with higher scores indicating higher confidence or less anxiety in communicating.²¹

The ICQ has demonstrated adequate internal consistency for the two subscales, with a Cronbach's alpha of 0.70 for Confidence and 0.72 for Anxiety.²¹ It has been found to be responsive, as students demonstrated both higher scores and changes in attitude after simulated patient experiences. For the purpose of this study, we measured the ICQ as a whole – termed 'Overall', as well as the two subscales, termed 'Confidence' and 'Anxiety'.

Data analysis

Data were analyzed using STATA 14.2© statistical software.²³ Paired *t*-tests measured differences between each time point for the ACCS, ICQ Overall, ICQ Confidence, and ICQ Anxiety. We ran four two-way repeated measures ANOVAs with each of our outcome measures of interest as the dependent variables: summed score on the ACCS, ICQ Overall, ICQ Confidence, and ICQ Anxiety. To address our main purpose, we interpreted the results of the dependent variables on both the cohort (C2019 or C2020) and time in the repeated measured analysis of variance (ANOVA). To address our secondary purpose of measuring change over time among all participants, we interpreted the results of the paired *t*-tests as well as the dependent variable on time in a two-way repeated measured ANOVA. The assumption of sphericity was checked using Mauchly's test of sphericity for the repeated

measures ANOVAs.²⁴ In cases where this assumption was violated, the Greenhouse-Geisser estimate was interpreted in place of the original *P*-value.

Normal distributions were qualitatively confirmed using scatterplots of the four dependent variables tested – ACCS, ICQ Overall, ICQ Confidence, and ICQ Anxiety. Outliers were assessed from boxplots using Stata® statistical software.²³ There was one outlier for the ACCS, and three found for the ICQ Overall. The four outliers were reviewed and did not appear to be related to any significant event or situation that occurred during the ICEs. Two observations were removed from the dataset prior to analysis – the one outlier for the ACCS and one for the ICQ – as they appeared to skew the data such that the assumption of normality for the ANOVA was violated, yet did not appear to be meaningful representations of student skill development when reviewed. The remaining two outliers for the ICQ were within two points of the interquartile range of the ICQ results, and thus were not considered to significantly skew the data.

Results

Sample

73 of 74 students completed both the ACCS and ICQ at all four time points (one in the C2020 did not complete the final ACCS or ICQ). See Fig. 2 for the observed changes in the dependent variables. Of note, there were improvements in each of the four dependent variables before and after ICE 1, before and after ICE 2, and over the entire course of the ICE curriculum. However, there was a minimal amount of improvement, and in some cases a

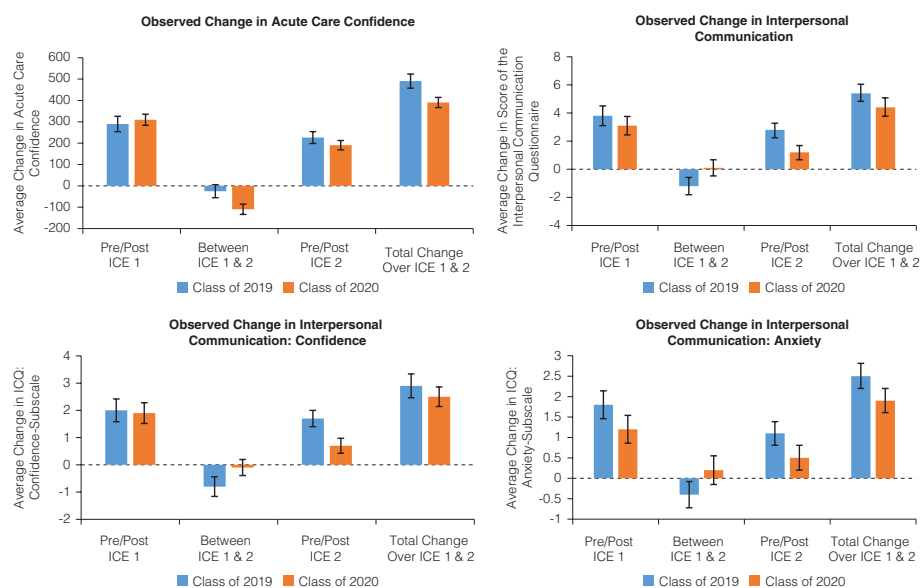


Fig. 2. Observed change scores in outcomes measures Pre- and Post- ICE 1 and 2. Error bars represent standard error.

decline, in scores of the outcome measures between ICE 1 and 2. Students gained an average of 440 points on the ACCS, and an average of 4.9 points on the ICQ Overall.

Main results

Acute care confidence

We conducted a two-way repeated measures ANOVA to compare the effect of ICE exposures over time and the cohort of student on acute care confidence. The assumptions of sphericity and normality were met prior to running the analysis. Measures were taken pre-ICE 1 (T0), post-ICE 1 (T1), pre-ICE 2 (T2), and post-ICE 2 (T3). The overall model yielded an R^2 effect size of 0.86. There was a significant interaction on acute care confidence by time, $F(3,213) = 169.6$, $P < 0.001$. The results showed that the timing of ICE elicited statistically significant differences in acute care confidence, with students demonstrating gains in acute care confidence with continued exposures. There was also a statistically significant interaction between time and cohort on acute care confidence, $F(3, 213) = 3.84$, $P = 0.01$, thus indicating that the C2019 noted a larger magnitude of change in scores over time than the C2020. However, there was not a statistically significant difference between cohort and acute care confidence, $F(1, 213) = 0.03$, $P = 0.86$, thereby indicating that there was not a notable difference in acute care confidence between the two cohorts.

Interpersonal communication

We conducted a two-way repeated measures ANOVA to compare the effect of ICE exposures over time and the cohort of students on self-reported interpersonal communication skills, using the ICQ Overall. The assumptions of sphericity and normality were met prior to running the analysis. The overall R^2 effect size for the model was 0.88. There was a significant interaction on interpersonal communication by time, $F(3,213) = 39.25$, $P < 0.001$. The results showed that the number of ICE exposures elicited statistically significant differences in interpersonal communication, with students demonstrating gains in interpersonal communication after ICE 1 and ICE 2. However, there was not a statistically significant difference between cohort and interpersonal communication, $F(1, 213) = 0.03$, $P = 0.40$. Nor was there a statistically significant interaction between time and cohort on interpersonal communication, $F(3, 213) = 1.24$, $P = 0.30$.

Confidence

We conducted another two-way repeated measures ANOVA to compare the effect of ICE exposures over time and the cohort of students on confidence with interpersonal communication, using the ICQ Confidence sub-scale. The R^2 effect size was 0.86. There was a significant

interaction on ICQ Confidence by time, $F(3,213) = 32.96$, $P < 0.001$. The results showed that the timing of ICE elicited statistically significant differences in confidence with interpersonal communication, with students demonstrating gains in communication confidence with continued exposures. There was not a statistically significant difference between cohort and ICQ Confidence, $F(1, 213) = 0.03$, $P = 0.86$. Nor was there a statistically significant interaction between time and cohort on ICQ Confidence, $F(3, 213) = 1.30$, $P = 0.27$.

Anxiety

We conducted a final two-way repeated measures ANOVA to compare the effect of ICE exposures over time and the cohort of student on anxiety with interpersonal communication, using the ICQ Anxiety sub-scale. The R^2 effect size was 0.62. There was a significant interaction on ICQ Anxiety by time, $F(3,213) = 25.41$, $P < 0.001$. The results showed that ICE 1 and ICE 2 elicited statistically significant improvements in anxiety with interpersonal communication, with students demonstrating less anxiety with continued exposures. There was not a statistically significant difference between cohort and ICQ Anxiety, $F(1, 213) = 2.18$, $P = 0.14$. Nor was there a statistically significant interaction between time and cohort on ICQ Anxiety, $F(3, 213) = 0.80$, $P = 0.50$.

Secondary results

Table 2 details the results of paired t -tests, comparing the ACCS scores each time point with a Bonferroni correction to mitigate the risk of false positive associations.²⁵ Paired t -tests of the ACCS were statistically significant between pre/post ICE 1 and 2, with $P = 0.016$ for the average total score for both cohorts, indicating statistically significant gains in confidence between each ICE for both cohorts. Paired t -tests of the ACCS between ICE 1 and 2 (i.e. between T1 and T2) indicate a statistically significant decline in ACCS between ICE 1 and 2, $P = 0.016$. There was a decline in acute care confidence between semesters where students did not have exposure to the acute care environment. Average scores between these two time points were 1122.4 post-ICE 1 and 1054.0 pre-ICE 2 – a 68.4 point difference.

Table 2 also includes paired t -tests comparing the Overall ICQ scores at each time point. Paired t -tests of the ICQ were statistically significant between pre/post ICE 1 and 2, with $P = 0.016$ for the average total score, indicating statistically significant gains in self-reported interpersonal communication skills. Paired t -tests of the ICQ between ICE 1 and 2 (i.e. between T1 and T2) were not statistically significant (mean score of 34.78 and 34.21 on ICE 1 and 2, respectively). There was minimal change in self-reported interpersonal communication skills between semesters where students had three academic semesters

Table 2. Results of paired t-tests for the classes of 2019 and 2020 combined

| Comparator 1: Mean | Comparator 2: Mean | t | df | p-value |
|--------------------------------------|--------------------------------------|--------|----|---------|
| ACCS at T0: 833.6 | ACCS at T1: 1122.4 | -13.60 | 73 | 0.016* |
| ACCS at T1: 1122.4 | ACCS at T2: 1054.0 | 3.34 | 73 | 0.016* |
| ACCS at T2: 1052.8 | ACCS at T3: 1262.2 | -13.7 | 72 | 0.016* |
| ACCS at T0: 833.6 | ACCS at T3: 1262.2 | -19.0 | 72 | 0.016* |
| ICQ Overall at T0: 31.38 | ICQ Overall at T1: 34.78 | -7.06 | 73 | 0.016* |
| ICQ Overall at T1: 34.78 | ICQ Overall at T2: 34.21 | 1.23 | 73 | 1.00 |
| ICQ Overall at T2: 34.23 | ICQ Overall at T3: 36.23 | -4.71 | 72 | 0.016* |
| ICQ Overall at T0: 31.38 | ICQ Overall at T3: 36.23 | -9.79 | 72 | 0.016* |
| ICQ Confidence Sub-scale at T0: 15.6 | ICQ Confidence Sub-scale at T1: 17.5 | -6.30 | 73 | 0.016* |
| ICQ Confidence Sub-scale at T1: 17.5 | ICQ Confidence Sub-scale at T2: 17.0 | 1.73 | 73 | 1.00 |
| ICQ Confidence Sub-scale at T2: 17.0 | ICQ Confidence Sub-scale at T3: 18.2 | -4.86 | 72 | 0.016* |
| ICQ Confidence Sub-scale at T0: 15.6 | ICQ Confidence Sub-scale at T3: 18.2 | -8.59 | 72 | 0.016* |
| ICQ Anxiety Sub-scale at T0: 15.8 | ICQ Anxiety Sub-scale at T1: 17.3 | -5.66 | 73 | 0.016* |
| ICQ Anxiety Sub-scale at T1: 17.3 | ICQ Anxiety Sub-scale at T2: 17.2 | 0.50 | 73 | 1.00 |
| ICQ Anxiety Sub-scale at T2: 17.2 | ICQ Anxiety Sub-scale at T3: 18.0 | -3.37 | 72 | 0.016* |
| ICQ Anxiety Sub-scale at T0: 15.8 | ICQ Anxiety Sub-scale at T3: 18.0 | -8.98 | 72 | 0.016* |

Note. t = t-statistic, df = degrees of freedom, *Indicates statistical significance with $P < 0.05$.

and an 8-week outpatient orthopedic clinical experience (but no exposure to the inpatient environment).

Because of the curricular changes caused by COVID-19, 13 of the 38 students in the C2020 did not get checked off on at least one objective on the ICE 2 objectives checklist. Students were missing 0.82 objectives on average (standard deviation [SD] = 1.67). The most commonly unchecked objective was #14 – Auscultates heart or lung sounds pre and post therapy session. All but three students had objective #11 checked – Safely completes a patient transfer using appropriate body mechanics. The students who did not check off this skill reported extenuating circumstances and a lack of time to complete, rather than an inability to complete the task. Because of the unforeseen and abrupt changes in curricular structure in the Spring of 2020, C2020 was not required to have all skills checked off on the ICE 2 objectives checklist if they demonstrated progress during completed ICE experiences.

Discussion

It did not appear that two to three fewer ICE exposures during the 2nd semester of ICE due to COVID-19 resulted in statistically significant differences in acute care confidence or interpersonal communication skills. In all four outcomes measures observed, the cohort that had more time in ICE outperformed the cohort that had fewer ICEs. However, the difference was not statistically significant, except for the cohort having an additional acute care exposure demonstrating a larger magnitude of change in ACCS scores. What is not known is the threshold for clinical readiness for each of these outcome measures, and if one or both cohorts crossed these thresholds. It does not

appear that decreased ICEs due to COVID-19 influenced confidence. Some skills, particularly more advanced acute care skills, were not checked for everyone in the C2020. However, the presence of a checked skill did not appear to significantly impact ACCS scores.

Our findings highlight the influence of ICEs on readiness to enter clinical education. It appears that some amount of clinical exposure is beneficial for student confidence in psychomotor and affective domain skills. The results also suggest that the gains in skill confidence may slow with continued time in ICE. These are promising results for those that are concerned with increasing problems of capacity to provide clinical education in inpatient settings,¹⁷ as some, but minimal, exposure may significantly improve student readiness for full-time experiences in these settings.

Our findings complement that of Mai and colleagues,⁶ who found that students who participated in ICE demonstrated statistically significant gains in the ICQ as compared with students who did not participate in ICE. Like Mai, though, gains noted over the entire course of the ICE may not be clinically meaningful. Students improved an average of 440 points on the ACCS and 4.9 points on the ICQ Overall, but it is unknown whether these improvements represent a clinically meaningful threshold for readiness to begin full-time clinical education. The program in the current study did not use cutoff scores on the ACCS or ICQ to determine readiness, as a minimally important difference for these tools has not yet been established. Furthermore, these trends may also be a result of recency bias, maturity of the students over time, or growth in knowledge of psychosocial aspects of

care throughout the curriculum. It is unknown how these factors may have influenced the results.

We also found that, in some cases, students had a decline in self-reported acute care confidence and interpersonal communication skills during the period where they were not participating in ICE, as measured by the ACCS and ICQ. During this time, they did participate in three academic semesters and one 8-week full-time clinical experience in the outpatient orthopedic setting. Based on these findings, it appears that confidence in acute care skills is setting-specific, and outpatient experiences do not translate to improved confidence in acute care treatment provision.

One would expect, however, that interpersonal communication would improve during a full-time clinical experience. One possible explanation for this decline in interpersonal communication skills (as measured by the ICQ) could be that increased exposure to the clinical environment in a full-time clinical experience made students more aware of their deficiencies in patient communication.²⁶ The increased patient interaction and responsibility required of the student during the first full-time clinical experience (versus an ICE) may have resulted in students becoming more aware of deficiencies in communicating with patients, thus causing worsened ICQ scores. Another possibility may be that exposure to the inpatient setting, where patients are sick and thus communication is more of a challenge, may result in improvements in interpersonal communication that were not seen during an outpatient orthopedic experience (where patients tend to be relatively healthy and without communication impairments).

Limitations

The data for this study were obtained from a single DPT program and therefore cannot be generalized. Some of the data were also obtained during an abrupt curricular change in the Spring of 2020 and cannot be separated from other potentially related, but unmeasured variables. Though age could foreseeably be a predictor of confidence in communication abilities, this was not captured at the time of data collection. The ACCS and ICQ were first implemented for use in this program in 2017, so it is unknown if the data captured in this study is consistent for the program.

Though there were not statistically significant differences between cohorts at baseline, it is likely that there is unmeasured heterogeneity between students and cohorts. The small sample size, limited by program size, may be a limiting factor in detecting differences in the ACCS and ICQ between cohorts. The ACCS was used in our study to measure the changes in psychomotor skill confidence. However, the students had exposure to acute care, inpatient rehabilitation, and outpatient experiences during ICE. The

improvements in psychomotor skills in outpatient and, to a lesser extent, inpatient rehabilitation were not analyzed.

Prior studies of the ACCS have been conducted on DPT students during their full-time acute care experiences.^{20,22} Students in the study by Greenwood et al. also had fewer reported hours of prior acute care experience than the cohorts in the present study (an average of 17.5 h vs. 134.4 h),²⁰ and therefore the internal consistency and responsiveness metrics from those studies are not easily generalizable to the present study that observed ACCS scores during 3 and 4 half-day clinical experiences.

Future directions

Future study is warranted to determine the optimal amount of student exposure to clinical settings to prepare students for full-time clinical education. Outcome measures that have a stated threshold for clinical readiness would be of great assistance to determine student preparedness. Standardized outcome measures that broadly measure the development of basic physical therapy skills would be beneficial in assessing student improvement during ICEs.

Conclusion

Based on our findings, it did not appear that two to three fewer ICE exposures (including one fewer acute care exposure) during the 2nd semester of ICE due to COVID-19 had clinically meaningful effects on student confidence in their psychomotor or affective skills in the rehabilitation environment. Students gain self-confidence and improve communication skills for clinical practice when involved in hands-on ICEs aimed at the practice of skills learned in the didactic portion of the curriculum. However, the gains in student confidence in the psychomotor and affective domains may slow with continued clinical exposure. Improvements in these areas were not seen between ICEs, thus indicating that didactic content and a full-time clinical experience in an outpatient setting did not improve these outcomes.

Conflict of interest and funding

None of the authors has a financial interest in any of the products, devices, or drugs mentioned in this manuscript.

Ethics statement

This study was exempted from review by the Institutional Review Board at the University of Texas Southwestern Medical Center.

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