

Nursing students' evaluation of clinical learning environment and supervision models before and during the COVID-19 pandemic: a comparative study

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Abstract. *Background and aim:* The COVID-19 pandemic has required a rapid reorganization of clinical training and supervision models for nursing education. The aim of this study was to compare students' levels of perception of the quality of the Clinical Learning Environment (CLE) using two different clinical supervision models. *Methods:* A comparative design was implemented. A convenience sample of second and third-year undergraduate nursing students (n=127) in clinical training in the 2018/2019 Academic Year (AY) received the usual nursing staff supervision model, while during the COVID-19 pandemic in the following year, they (n=72) received an individualized supervision model. Data were collected using three instruments: the Clinical Learning Environmental Quality Evaluation Index (CLEQI); the Clinical Learning Environment, Supervision and Nurse Teacher Scale (CLES+T); and a socio-demographic tool. *Results:* The mean total scores of both scales had increased in the second survey (CLEQI: M=57.88±11.8 vs. M=60.88±9.3, p=0.035; CLES+T: M=148.4±23.3 vs. M=154.5±21.9, p=0.037). The nursing students reported high levels of CLE quality with both supervision models, even though the individualized supervision model was rated significantly higher by the students than the staff supervision model. *Conclusions:* Students supported by a personal supervisor during clinical training had a more positive experience and rated the quality of the tutorial strategies, learning opportunities, safety and nursing care, leadership style of the ward manager and overall CLE more highly. (www.actabiomedica.it)

Key words: clinical training, individualized supervision model, nursing staff supervision model quality, personal supervisor

Introduction

Clinical training is a fundamental and essential part of pre-registration nursing education degree programs (1). While the usefulness of other training methods, such as simulation, is recognized, the development

of clinical competences aimed at person-centered care requires clinical learning carried out in a "real world context", in the complex health care settings (2). Clinical learning combines theoretical knowledge with real nursing scenarios enabling anticipatory socialization to work and the development of necessary clinical

skills, such as critical thinking, clinical reasoning, decision making and specialized skills (1-8). In this regard, the Clinical Learning Environment (CLE) is helpful in ensuring significant and progressive learning outcomes (9). Evidence suggests that the CLE reflects a psycho-social organizational context which influences teaching and learning processes (9,10). A systematic review and meta-synthesis documented that an unsupportive CLE combined with unwelcoming clinical staff, a lack of expertise among clinical supervisors, and a lack of sense of belonging among students, may negatively impact students' learning (11). From the students' perspective, clinical practice can be stressful due to their lack of knowledge and professional skills and a fear of making mistakes when taking care of patients, but this may also be due to the lack of relationship between students and preceptors, as well as negative attitudes and behaviors on the part of preceptors (1,6,12). On the other hand, nursing students' perception of a safe clinical environment may impact the development of professional skills and academic career. Clinical training is the most important factor in the retention of nursing students and clinical placement experience is closely linked to nursing students' decisions to withdraw from their nursing program (13,14). Here, a safe CLE is defined as a setting that offers higher learning opportunities, good examples of the safety and quality of nursing care, high quality of mentoring strategies, and opportunities to engage in self-directed learning (15). A supportive and positive CLE is a welcoming area in which collaboration occurs and mutual respect is observed (8,16). In addition to CLE, learning through clinical placements is also based on the clinical supervision model (17-20). The supervision provided by qualified nurses in clinical placements helps students to link theoretical knowledge with practical knowledge, increases student empowerment, engages students in their own learning process, enhances motivation and influences professional development, identity, and socialization (1,6,21-25). By familiarizing students with the culture and norms of the profession, clinical supervision can also influence their future professional choices (26,27). In recent years, several models of clinical supervision have been identified and they can be divided into two main categories: the individualized supervision model

and the nursing staff supervision model (28,29). In the case of the former model, the student is under the supervision of a registered nurse trained in tutorial strategies by faculty and responsible for the clinical teaching of students in addition to nursing care responsibilities. In the latter case, the student does not have a personal supervisor, but he or she is supervised by staff nurses through rostering (29). Several studies have shown a positive association between student satisfaction and the individualized supervision model (28,30,31). However, there are other factors that also influence student satisfaction including the clinical setting, the tutoring method adopted and the frequency of meetings with the nurse teacher (30,32). It has been reported that clinical placements and supervisors have the greatest impacts on student retention and individualized supervision can be dangerous if the relationship between the student and supervisor is not effective (33). In addition, the individualized supervision model requires that the student's shifts during the clinical training placement be the same as those of the assigned supervisor, who often works through day and night shifts, including weekends (24/7 shifts). This implies the need to consider the student's opinion about clinical training placement designed with 24/7 shifts and their consequences for students' academic careers, private life, and health, including their sleep quality, stress levels, and difficulties in achieving work-life balance (34). The student's presence on the night shift can be a barrier to achieving not only work-life balance but also learning outcomes, about which little is known, and the available evidence is contradictory (5,35-38). In fact, nurse educators who plan students' shifts during their clinical training placement should consider the entire educational process, based on the expected learning outcomes and also the students' position, academic careers and health (39). However, other studies have reported students' preference for the nursing staff supervision model because it promotes personal and professional growth, and it offers multiple role models and insights into the specific skills of nurses in the team (40-42). While it is clear that student satisfaction is influenced by the CLE and supervision models, two recent reviews concluded that definitive results regarding the optimal supervision model are not available due to the small number of group supervision samples

and variable models, thus suggesting that further research is needed to provide empirical evidence (8,43). However, in the last few years, both CLE and clinical supervision models have been greatly affected by the health emergency caused by coronavirus disease 2019 (COVID-19). The pandemic dramatically affected learning opportunities; for many months, clinical training placements were suspended, university sites were closed, and in-person courses switched to online teaching (44). Innovative teaching and learning strategies implemented in virtual environments to promote knowledge, skills and attitudes have been demonstrated to have benefits such as the capacities for increasing dialogue, building a sense of community and strengthening the relationship between students and their educators (45). Although there has been a spate of interest in evaluating their effectiveness little is known about students' perceptions of clinical supervision models (46-51). A recent qualitative study showed that during the COVID-19 pandemic, learning processes were characterized by complexity, chaos, confusion, and challenges that hindered or stimulated learning among nursing students (52). In another qualitative phenomenological study, students stated that they learned to work with fear and uncertainty, and to self-manage their emotional loads by using different coping strategies to cope with learning in practices. Clinical supervisors were identified as the most important support for students, and students were reassured after discussing their concerns with them (53). The health emergency caused by the COVID-19 pandemic provided nurses with a different clinical learning opportunity that impacted learning outcomes (54,55). The pandemic forced students and clinical supervisors to rapidly adapt to teaching in new CLEs where social distancing had to be ensured in order to protect staff and students, consequently influencing the choice of clinical supervision model (56). Therefore, in order to provide high-quality clinical training, we must evaluate students' perceptions of their clinical learning environments and supervision model (1). In this context, the aim of this study was to compare students' perceptions of the quality of a CLE with two different models of clinical supervision before (nursing staff supervision model) and during the COVID-19 pandemic (individualized supervision model).

Participants and methods

Design and setting

A comparative study was carried out. We compared nursing students' perceptions of the quality of the CLE before (Academic Year 2018/2019) and during the COVID-19 pandemic (Academic Year 2019/2020) based on the two different clinical supervision models. The study was conducted with a convenience sample at the Nursing Program of the University of Modena and Reggio Emilia, located in Modena (Italy), one of the regions most affected by the pandemic in terms of numbers of cases and deaths (57). In this Nursing program, the assessment of the quality of the CLE is part of the university's quality assurance system for the continuous improvement of educational services.

Clinical supervision models

In the Academic Year (AY) of 2018/2019, before the COVID-19 pandemic, a nursing staff supervision model was applied, whereby the students were supervised by the entire nursing staff during their clinical placements. In this model, the student attends his/her clinical placement from Monday to Friday and works only during daytime hours. He or she works alongside the clinical nurses present in the ward that day, while they provide and are responsible for patient care, without continuity in the supervision provided by clinical nurses throughout the placement. In this study, the ratio of clinical nurse to students ranged from a ratio of two to four students. Each ward has a Clinical Teacher (CT), an experienced clinical nurse who has attended a special 50-hour training course for this role (a university course on fundamentals such as clinical teaching, briefing, debriefing and assessment). The CT only occasionally supervises the student because he or she follows a 24-hour shift pattern. The Nurse Teacher (NT) is a visiting academic instructor who delivers weekly meetings with a group of students from related clinical areas. The CT, in collaboration with the NT, assesses the students' clinical practice in the middle and at the end of the internship period, after consulting the clinical nurses in the department

who work with the student during the placement. In the AY of 2019/2020, starting from June 2020, we decided to change the clinical supervision model. The motivation for this change was to be able to restart student internships, suspended due to the COVID-19 pandemic, in order to allow the safe resumption of internships for students, caregivers and staff, avoid negative influences on health student learning outcomes and support the psychological health of nursing students.

The student, during his/her clinical placements, was assisted by the Clinical Supervisor (CS) following his/her shift pattern, with 24-hour timetable programming according to the individualized supervision model. In this model, the CS is an expert clinical nurse who orients, motivates, supports, supervises, monitors and assesses the student's clinical practice whilst maintaining responsibility for patient care. In this study, the functions performed by the CT and NT remained largely unchanged from the previous year (2018/2019 AY). Moreover, in the student's mid-term and final assessment, in addition to the CT and NT, the CS was involved, supervising the student in a one-to-one mode. Before the start of the clinical practice experience, all students participated in pre-clinical training sessions on the provision of safe patient care and attended a distance learning course organized by the Italian National Institute of Health entitled "Health emergency from new coronavirus SARS-CoV-2 preparedness and contrast".

Participants

A convenience sample of all undergraduate nursing students, in their 2nd and 3rd year, during the AYs of 2018/2019 and 2019/2020 were eligible for the study. In detail, in the AY 2018/19 there were 235 students (2nd year $n=113$, 3rd year $n=122$) and in the AY 2019/20 there were 218 (2nd year $n=108$, 3rd year $n=110$). CLE evaluations were filled out at the end of the students' clinical training placements in the second semester of each AY. A power analysis was performed using G.Power 3.1.9.7 software to determine the sample size. By fixing the parameters as $\alpha = 0.05$ and $1-\beta = 0.80$, with an effect size = 0.5, the minimum sample size was found to be 102 nursing students.

Instruments

Data was collected from the university database "Unimore ESSE3" with the following three instruments:

1. Socio-demographic questionnaire regarding gender, age, secondary education, secondary education grade score [from 60 (sufficient) to 100 (excellent)], academic year attended, and setting in which clinical training was undertaken.
2. The Clinical Learning Environmental Quality Evaluation Index (CLEQI) is an Italian instrument for evaluating the quality of clinical learning as perceived by nursing students, developed and validated in an Italian national project involving 27 universities and 9607 undergraduate nursing students (Cronbach's alpha 0.95) (55,58). The scale is composed of 22 items divided into five factors: "Quality of the tutorial strategies" (six items), "Learning opportunities" (six items), "Safety and nursing care quality" (four items), "Self-directed learning" (three items), and "Quality of the learning environment" (three items). Each item was scored on a 4-point Likert-type scale (0 = nothing, 1 = enough, 2 = much, 3 = very much). The higher the score was, the higher the quality of the environment for learning was deemed to be. In our study, the CLEQI obtained a Cronbach's alpha coefficient that was equal to 0.97 for the total scale and ranged from $\alpha=0.883$ to $\alpha=0.936$ for the following factors: "Quality of the tutorial strategies" $\alpha=0.926$, "Learning opportunities" $\alpha=0.936$, "Safety and nursing care quality" $\alpha=0.883$, "Self-directed learning" $\alpha=0.928$, and "Quality of the learning environment" $\alpha=0.891$.
3. The Clinical Learning Environment, Supervision and Nurse Teacher (CLES+T) scale is currently the most translated and validated instrument across countries to evaluate nursing student's experiences and perceptions of their CLE and supervision model (59). In this study, the validated Italian version of the scale

was adopted, which has excellent internal consistency (60). The 34 items of the CLES+T are divided into five factors: “Pedagogical atmosphere” (nine items), “Leadership style of the ward manager” (four items), “Supervisory relationship” (eight items), “Premises of nursing in the ward” (four items), and “Role of the nurse teacher” (nine items). Students answer each statement on a 5-point Likert-type scale according to their level of agreement (1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree). In our study, the internal consistency measured with Cronbach’s alpha was 0.97 for the total scale and ranged from $\alpha=0.929$ to $\alpha=0.973$ for the following dimensions: “Pedagogical atmosphere” $\alpha=0.944$, “Leadership style of the ward manager” $\alpha=0.929$, “Supervisory relationship” $\alpha=0.911$, “Premises of nursing on the ward” $\alpha=0.973$ and, “Role of the nurse teacher” $\alpha=0.944$.

The overall compilation time for all tools was approximately 40 minutes.

Statistical analysis

Data are presented as percentages and, means (M) \pm standard deviations (SD). Assumptions of normal distributions were checked. Associations between study characteristics and the statistical methods’ appropriateness were assessed using chi-squared test or Fisher’s exact test. The statistical significance of the differences between the two groups was calculated using independent t-test and analysis of variance (ANOVA). Additionally, to avoid Type I error inflation, we applied the Holm-Bonferroni correction for multiple tests. A p-value less than 0.05 was considered statistically significant. Cronbach’s alpha coefficient was calculated for the internal consistency of the total scales as well as the subdimensions used in the analysis. An alpha below 0.80 indicates the items are not adequately interrelated. Statistical analyses were performed using the SPSS Software Package version 26 (SPSS Inc., Chicago, IL, USA).

Ethical considerations

The study was approved by the Local Ethics Committee of Vasta Area Emilia Nord (protocol 9154-21 as of 24 March 2021). It was conducted following the principles of the Declaration of Helsinki of the World Medical Association (1964) and the General Data Protection Regulation (Regulation EU 2016/679). All students received both oral and written information about the aims of this study. In particular, students were informed about the voluntary participation and that it would not affect their education or legal rights. They gave informed consent to participate in the study as when they answered the questionnaire. There was no form of coercion or undue influence on the students regarding participation. Participants were reassured about the confidentiality of the data collected.

Results

In the AY of 2018/2019, 127 students with a mean age of $M=24.8\pm 2.7$ SD years completed the questionnaires, and 85.6% of them were female, representing a response rate of 54%. The mean secondary education grade score was $M=79\pm 11$ SD out of 100. In the AY of 2019/2020, 72 students with a mean age of $M=24.7\pm 3.8$ SD years, including 85.6% females, completed the questionnaire, representing a response rate of 33%. The mean secondary education grade score was $M=80.6\pm 11$ SD. The clinical training settings of the students, in the two academic years, are reported in Table 1.

CLEQI results

In the AY of 2018/2019, the CLEQI scale was completed by 64 2nd-year students and 63 3rd-year students and there were no statistically significant differences in the overall CLEQI score between students in the two course years (2nd-year students $M=57.9\pm 12$ SD; 3rd-year students $M=57.9\pm 11.7$ SD; $t=-0.022$, $p=0.983$). In the AY of 2019/2020, the CLEQI scale was completed by 30 2nd-year students and 42 3rd-year students. The overall CLEQI scores showed no statistically significant differences between the two cohorts

Table 1. Clinical training settings in the two academic years.

Clinical settings	AY 2018/2019 n (%)	AY 2019/2020 n (%)	p-value
Medicine	31 (24.4%)	9 (13.1%)	p<0.001 [†]
Surgery	26 (20.5%)	23 (33.3%)	p=0.668 [†]
Critical care	20 (15.7%)	8 (11.6%)	p=0.023 [†]
Operating room	11 (8.7%)	5 (7.2%)	p=0.134 [†]
Community care	10 (7.9%)	4 (5.8%)	p=0.180 [§]
Dialysis	8 (6.3%)	6 (8.7%)	p=0.593 [†]
Pediatrics	8 (6.3%)	2 (2.9%)	p=0.109 [§]
Oncology	7 (5.5%)	4 (5.8%)	p=0.549 [§]
Psychiatry	6 (4.7%)	8 (11.6%)	p=0.593 [†]

Notes: [†]chi-squared test; [§]Fisher's exact test; *p-value <0.05.

of students (2nd-year students M=61.6±5.7 SD, 3rd year students M=60.4±11.2 SD; t=0.533, p=0.596). Male students reported higher overall CLEQI score compared to females in both AY 2018/2019 (male M=58.4±12.4; female M=57.8±11.8) and AY 2019/2020 (male M=65±1.9; female M=60.2±9.8), with a statistically significant difference only observed in AY 2019/2020 (t=3.410, p=0.001). Overall, the CLEQI scale revealed a statistically higher mean score for clinical training with the individualized supervision model, during the COVID-19 pandemic, compared to the nursing staff supervision model of the previous period (AY 2018/2019 M=57.88±11.8 SD, AY 2019/2020 M=60.88±9.3 SD; t=-1.826, p=0.035) (Table 2).

Comparing the CLEQI factor scores between the two academic years, there was an increase in the mean values for the clinical training periods conducted during the COVID-19 pandemic compared to the previous period. Statistically significant differences were observed in the following four factors, "Quality of the tutorial strategies" (t=-1.829, p=0.034), "Learning opportunities" (t=-1.720, p=0.043), "Safety and nursing care quality" (t=-1.813, p=0.036) and "Quality of the learning environment" (t=-1.803, p=0.036). Statistically significant differences also emerged in the following items of the "Quality of the tutorial strategies" Factor: "The preceptor explained me the clinical thinking underlying clinical decisions", "The preceptor was

enthusiastic to teach me about nursing practice" and "The preceptor's final evaluation was consistent with the feedback I received during the clinical experience". In addition, statistically significant differences were also observed in the following four items of the scale: "I was given an adequate number of responsibilities", "Patient safety was guaranteed", "This setting has been a good learning environment" and "Overall, I am satisfied with my clinical learning experience" (Table 2).

In AY 2018/2019, students who graduated from technical secondary school expressed lower overall CLEQI score, while those who obtained secondary school qualifications abroad expressed higher scores (technical school M=56±12.5 SD, professional school M=56.6±10 SD, teacher school M=57.7±10.2 SD, high school M=58.8±12.3 SD, secondary school abroad M=63±0 SD). In contrast, in AY 2019/2020, students who graduated from secondary school abroad expressed lower overall scores on the Likert scale of the CLEQI, while those who obtained a teacher school education expressed higher scores (secondary school abroad M=50±0 SD, high school M=60.31±11.5 SD, technical school M=60.47±7.3 SD, professional school M=62.18±4.5 SD; teacher school M=64.60±1.5 SD). However, no statistically significant differences were found between the degree earned and the overall CLEQI score, in either academic year.

As shown in Table 3, the means of the overall CLEQI score did not change in a statistically significant way, between the 2 AYs, in any of the clinical training settings. The lowest mean of the overall CLEQI score was observed for the pediatric unit in both surveys, while during the pandemic, the mean overall score expressed by students in the community care setting showed an increase. In the AY 2018/2019, the means of the overall CLEQI score did not differ in function of the clinical training setting. Instead, in the following AY, the differences in the overall CLEQI score, between units, were statistically significant (F=2.646, p=0.02). We performed a post hoc test (Bonferroni-Holm Correction for Multiple Comparisons) to understand the significant differences between which contexts. This analyze revealed that pediatrics had a significantly lower mean overall CLEQI score than the following clinical settings: medicine (p<0.0046), surgery (p=0.0051), community

Table 2. CLEQI scores before and during the COVID-19 pandemic.

CLEQI Factors, Items	Staff supervision model AY 2018/2019 (n=127)	Individualized supervision model AY 2019/2020 (n=72)	p-value [†]
	Mean±SD	Mean±SD	
Quality of the tutorial strategies (factor range 0-18)	15.76±3.5	16.65±2.7	0.034[*]
1. The preceptor explained me the clinical thinking underlying clinical decisions	2.67±0.6	2.83±0.5	0.028 [*]
2. The preceptor asked me questions to help me in clinical thinking	2.65±0.7	2.77±0.5	0.109
3. I had the opportunity to share with the preceptor the emotions experienced during the clinical experience	2.61±0.7	2.78±0.6	0.051
4. The preceptor mediated my relationship with patients/ family members in difficult situations	2.61±0.7	2.67±0.7	0.283
5. The preceptor was enthusiastic to teach me nursing practice	2.57±0.7	2.78±0.5	0.015 [*]
6. The preceptor's final evaluation was consistent with the feedback I received during the clinical experience	2.64±0.7	2.83±0.5	0.031 [*]
Learning opportunities (factor range 0-18)	16.08±3.2	16.87±2.7	0.043[*]
7. I felt trust	2.67±0.6	2.78±0.5	0.104
8. I was given the opportunity to experience activities independently	2.66±0.6	2.80±0.5	0.057
9. I was given an adequate amount of responsibilities	2.69±0.6	2.86±0.5	0.024 [*]
10. I was given the opportunity to express my opinions and critical reflections	2.71±0.6	2.86±0.5	0.048 [*]
11. I felt respected as a student	2.70±0.6	2.81±0.5	0.101 ^a
12. I felt encouraged during difficult situations	2.65±0.6	2.77±0.6	0.109
Safety and nursing care quality (factor range 0-12)	11.02±1.8	11.46±1.2	0.036[*]
13. Nurses fulfilled good standard of professional practice	2.73±0.6	2.84±0.4	0.086
14. Patient's safety was guaranteed	2.78±0.5	2.91±0.3	0.024 [*]
15. Individual and safety devices were accessible	2.88±0.4	2.96±0.3	0.087
16. Nurses showed passion for the profession	2.62±0.6	2.75±0.5	0.061
Self-directed learning opportunities (factor range 0-9)	7.43±2.3	7.83±2.2	0.124
17. I was offered meetings about my learning needs	2.38±0.9	2.58±0.8	0.059
18. I was invited to develop my self-learning plan	2.52±0.8	2.61±0.8	0.223
19. I was invited to do a self-evaluation	2.54±0.8	2.64±0.7	0.192
Quality of the learning environment (factor range 0-9)	7.60±2.1	8.13±1.6	0.036[*]
20. This setting has been a good learning environment	2.62±0.7	2.81±0.5	0.019 [*]
21. Overall, I am satisfied with my clinical learning experience	2.61±0.7	2.84±0.5	0.007 [*]
22. I would like to come back to this setting to work	2.37±0.9	2.48±0.9	0.215
Overall CLEQI score (total score range 0-66)	57.88±11.8	60.88±9.3	0.035[*]

Abbreviations: CLEQI, Clinical Learning Quality Evaluation Index; SD, Standard Deviation. Notes: [†]independent t-test; ^{*}p-value <0.05; Items CLEQI score: from 0 = "nothing" to 3 = "very much"; Overall CLEQI score: from 0 = "minimum" to 66 = "maximum".

Table 3. Overall CLEQI scores by clinical training placements.

Overall CLEQI score	Staff supervision model AY 2018/2019 (n=127) Mean±SD	Individualized supervision model AY 2019/2020 (n=72) Mean±SD	p-value [†]
Critical care	61.10±8.6	60.88±8.7	p=0.950
Oncology	56.57±9.3	63±3.8	p=0.225
Pediatrics	48.50±14.7	35.5±43.1	p=0.446
Medicine	59.68±11.2	62.67±5.3	p=0.446
Surgery	54.31±15.3	60.91±6.7	p=0.062
Operating room	60.09±8.7	58.8±9.5	p=0.792
Dialysis	63.50±4.5	60±6.6	p=0.257
Community care	54.30±12.7	66±0	p=0.098
Psychiatry	61.83±8.7	63.5±3.0	p=0.623

Abbreviations: CLEQI, Clinical Learning Quality Evaluation Index; SD, Standard Deviation. Notes: [†]independent t-test; [†]p-value <0.05; Overall CLEQI score: from 0 = “minimum” to 66 = “maximum”.

care (p=0.0038), and psychiatry (p=0.0035). No other significant differences were found.

CLES+T results

In the AY 2018/2019 the CLES+T scale was filled out by 64 2nd-year students and 63 3rd-year students. There were no statistically significant differences in the overall mean CLES+T score between the two cohorts of students (2nd-year M=147.8±23 SD, 3rd-year M=149.3±24 SD; t=-0.353, p=0.724). In the AY 2019/2020 the CLES+T was completed by 30 2nd-year and 42 3rd-year students. The overall mean CLES+T score showed no statistically significant differences between the two cohorts (2nd year M=153.8±21.7 SD, 3rd year M=154.3±22.3 SD; t=0.230, p=0.819). Male students reported higher overall CLES+T score than females in both AY 2018/2019 (male M=156.4±20.4 SD; female M=146.6±23.6 SD) and AY 2019/2020 (male M=167.8±4.2 SD; female M=152.6±22.7 SD), with statistically significant differences observed in the second period (t=4.778, p=0.01).

Overall, the students reported a statistically higher mean score based on the CLES+T for the individualized supervision model, during the COVID-19 pandemic, compared to the previous period (nursing staff supervision model) (AY 2018/2019 M=148.4±23.3

SD vs AY 2019/2020 M=154.5±21.9 SD; t=-1.790, p=0.037) (Table 4).

Comparing the CLES+T factors scores for the two academic years, the factor of the “Pedagogical atmosphere” had higher values in the second survey, with a significant difference for the item “During staff meetings (e.g., before shifts) I felt comfortable taking part in the discussions” (t=-2.107, p=0.018). Statistically significant differences emerged in the factor of “Leadership style of the ward manager (WM)” (t=-2.00, p=0.023) and the items “The WM regarded the staff on her/his ward as a key resource” (t=-2.213, p=0.014), “The WM was a team member” (t=-1.831, p=0.034) and “Feedback from the WM could easily be considered in a learning situation” (t=-2.087, p=0.019). In AY 2019/2020 the factor of “Premises of nursing on the ward” had higher mean scores than it did in the previous AY (t=-1.836, p=0.034), especially for the items “The ward’s nursing philosophy was clearly defined” (t=-2.513, p=0.006) and “Patients received individual nursing care” (t=-2.259, p=0.012). In the second survey, students reported higher values for the factors of the “Supervisory relationship” and the “Role of the nurse teacher (NT)” without a statistically significant difference when compared with the previous academic year. Finally, the item “The NT and the clinical team supported my learning” showed

Table 4. CLES+T scores before and during covid-19 pandemic.

CLES+T Factors, Items	Staff supervision model AY 2018/2019 (n=127)	Individualized supervision model AY 2019/2020 (n=72)	p-value [†]
	Mean±SD	Mean±SD	
Pedagogical atmosphere (factor range 9-45)	39.90±6.7	41.18±6.2	0.095
1. The staffs were easy to approach	4.40±0.9	4.39±1.0	0.45
2. During staff meetings (e.g. before shifts) I felt comfortable taking part in the discussions	4.44±0.9	4.69±0.7	0.018*
3. I felt comfortable going to the ward at the start of my shift	4.41±1.0	4.63±0.7	0.059
4. There was a positive atmosphere on the ward	4.36±0.9	4.46±0.9	0.231
5. The staffs were generally interested in student supervision	4.25±1.0	4.44±1.0	0.095
6. The staff learned to know the students by their personal names	4.67±0.7	4.60±0.8	0.269
7. There were sufficient meaningful learning situations on the ward	4.50±0.8	4.68±0.6	0.269
8. The learning situations were multi-dimensional in terms of content	4.40±0.9	4.61±0.8	0.055
9. The ward can be regarded as a good learning environment	4.47±0.9	4.68±0.8	0.054
Leadership style of the ward manager (factor range 4-20)	16.60±3.9	17.71±3.5	0.023*
10. The WM regarded the staff on her/his ward as a key resource	4.30±1.0	4.61±0.8	0.014*
11. The WM was a team member	3.94±1.2	4.25±1.1	0.034*
12. Feedback from the WM could easily be considered a learning situation	4.01±1.1	4.35±1.0	0.019*
13. The effort of individual employees was appreciated	4.36±0.9	4.50±0.8	0.129
Premises of nursing in the ward (factor range 4-20)	18.00±3.1	18.76±2.3	0.034*
14. The ward's nursing philosophy was clearly defined	4.47±0.8	4.75±0.6	0.006*
15. Patients received individual nursing care	4.49±0.9	4.75±0.6	0.012*
16. There were no problems in the information flow related to patients' care	4.45±0.9	4.54±0.8	0.247
17. Documentation of nursing (e.g. nursing plans, daily recording of nursing procedures, etc.) was clear	4.59±0.8	4.72±0.7	0.125
Supervisory relationship (factor range 8-40)	35.60±6.9	36.85±6.7	0.090
18. My supervisor showed a positive attitude towards supervision	4.52±0.9	4.65±0.9	0.148
19. I felt that I received individual supervision	4.33±1.1	4.44±1.1	0.226
20. I continuously received feedback from my supervisor	4.30±1.1	4.51±1.0	0.086
21. Overall I am satisfied with the supervision I received	4.40±1.0	4.60±1.0	0.098
22. The supervision was based on a relationship of equality and promoted my learning	4.48±0.8	4.64±0.8	0.099
23. There was a mutual interaction in the supervisory relationship	4.48±0.9	4.63±0.9	0.136
24. Mutual respect and approval prevailed in the supervisory relationship	4.60±0.8	4.76±0.6	0.066
25. The supervisory relationship was characterized by a sense of trust	4.49±0.9	4.61±0.9	0.184
Role of the nurse teacher (factor range 9-45)	38.33±7.5	39.97±7.7	0.072
26. In my opinion, the NT was capable of integrating theoretical knowledge and everyday practice of nursing	4.52±0.7	4.54±0.8	0.434
27. The NT was capable of operationalising the learning goals of this placement	4.48±0.7	4.67±0.8	0.076 ^a

Table 4 (Continued)

CLES+T Factors, Items	Staff supervision model AY 2018/2019 (n=127)	Individualized supervision model AY 2019/2020 (n=72)	p-value [†]
	Mean±SD	Mean±SD	
28. The NT helped me to reduce the theory-practice gap	4.40±0.8	4.43±1.1	0.425
29. The NT was like a member of the nursing team	3.61±1.5	3.79±1.5	0.203
30. The NT was able to give his or her expertise to the clinical team	3.99±1.3	4.22±1.2	0.105
31. The NT and the clinical team worked in supporting my learning	4.05±1.2	4.50±1.0	0.004*
32. The common meetings between myself, mentor and NT were comfortable experience	4.40±0.8	4.60±0.9	0.059
33. In our common meetings I felt that we are colleagues	4.48±0.8	4.63±0.9	0.136
34. Focus on the meetings was on my learning needs	4.40±0.9	4.60±0.9	0.067
Overall CLES+T score (Total score range 34-170)	148.4±23.3	154.5±21.9	0.037*

Abbreviations: CLES+T, Clinical Learning Environment, Supervision and Nurse Teacher; SD, Standard Deviation; WM, Ward Manager; NT, Nurse Teacher. Notes: [†]independent t-test; *p-value <0.05; Items CLES+T score: from 1 = "strongly disagree" to 5 = "strongly agree"; Overall CLES+T score: from 34 = "minimum" to 170 = "maximum".

a statistically significant increase in its mean value ($t=-2.702$, $p=0.004$) (Table 4). In AY 2018/2019, students who graduated from secondary schools abroad expressed lower overall CLES+T score, while those who obtained a professional school education expressed higher score (secondary school abroad $M=141\pm 0$ SD, teacher school $M=144.6\pm 23.8$ SD, technical school $M=146.8\pm 22$ SD, high school $M=150.6\pm 25.1$ SD, professional school $M=156.3\pm 12.6$ SD). In contrast, in AY 2019/2020, students who graduated from teacher schools expressed lower overall CLES+T scores, while those who obtained secondary school education abroad expressed higher score (teacher school $M=150.1\pm 20$ SD, technical school $M=152.6\pm 16.1$ SD, professional school $M=153\pm 25.3$ SD, high school $M=156.3\pm 25.6$ SD, secondary school abroad $M=163\pm 0$ SD). There were no statistically significant differences between the high school qualifications held and the overall CLES+T score in either academic year.

As shown in Table 5, the means of the overall CLES+T score did not change in a statistically significant way, between the 2 AYs, in any of the clinical training settings, except oncology. The lowest mean of the overall CLES+T score was observed for the pediatric unit in both surveys.

In the AY 2018/2019, the means of the overall CLES+T score did not differ in function of the clinical training setting. Instead, in the following AY, the differences in the overall CLES+T score between units were statistically significant ($F=2.35$, $p=0.03$), with higher mean values for the following clinical training settings: Critical care unit, Oncology unit and Community care. However, after the application of the Bonferroni-Holm Correction for Multiple Comparisons, which provided adjusted p-values, no comparison was statistically significant.

Discussion

The COVID-19 pandemic has created unprecedented challenges and opportunities for students' learning. Major restrictions have been imposed on nursing degree programs and, in some countries, a significant number of clinical learning experiences have also been suspended with possible repercussions on students' achieved skills (44,61,62). Although nursing education has been strongly influenced by this context, in our nursing degree program, the rapid and dynamic adaptation of CLEs enabled the return to clinical

Table 5. Overall CLES+T scores by clinical training placements.

Overall CLES+T score	Staff supervision model AY 2018/2019 (n=127) Mean±SD	Individualized supervision model AY 2019/2020 (n=72) Mean±SD	p-value [†]
Critical care	155.7±22.1	167±5.1	p=0.274
Oncology	139.7±18.7	162.4±11	p=0.041*
Pediatrics	131.7±29.8	100.5±83	p=0.382
Medicine	148.5±21.5	154±28.1	p=0.496
Surgery	142.6±27.6	154.6±16.4	p=0.078
Operating room	153.7±20.4	157.6±17.6	p=0.722
Dialysis	156.4±16.4	146.2±16.4	p=0.286
Community care	149±21.7	163.6±9.1	p=0.178
Psychiatry	163.4±13.7	154±14.6	0.262

Abbreviations: CLES+T, Clinical Learning Environment, Supervision and Nurse Teacher; SD, Standard Deviation.

Notes: [†]independent t-test; *p-value <0.05; Items CLES+T score: from 1 = “strongly disagree” to 5 = “strongly agree”; Overall CLES+T score: from 34 = “minimum” to 170 = “maximum”.

placements, even during the COVID-19 pandemic, and this measure ensured the learning progression of nursing students. Since the usual model of supervision in clinical placements was modified to ensure a safe and effective return to clinical training, the aim of the study was to compare students' perceptions of the quality of the CLE with two different models of clinical supervision before (nursing staff supervision model) and during the COVID-19 pandemic (individualized supervision model). Students reported high levels of CLE quality for both supervision models, with concordance between the two scales adopted, although the individualized supervision model was rated significantly higher by the students than the staff supervision model. The high ratings of the CLE and supervision expressed by the students indicate positive learning experiences that according to the literature promote the development of clinical skills and increase students' confidence as independent nursing professionals (16,43,63,64). These results, which are promising results for nursing education in clinical practice, are in line with recent studies (43,65). According to the CLEQI findings, students reported a significantly higher appreciation for the quality of the learning environment in four out of five dimensions with the adoption of the individualized supervision model,

during the pandemic period, in terms of quality of the tutorial strategies, perceived opportunities for learning, safety of care delivered, and the quality of the CLE. The respondents pointed out that, with the one-to-one model, there was more opportunity for the supervisor to explain the clinical thinking underlying clinical decisions, and the preceptor's final evaluation was consistent with the feedback students received during their clinical experience. Myall et al. (2008) found that students preferred a one-to-one tutorial system because it offers better opportunities for feedback from the clinical supervisor (66). On the other hand, Arkan et al. (2018) suggested that a high ratio of students to clinical supervisors, limiting the amount of time that the preceptor spends with each student, can lead the preceptor to evaluate the student incorrectly (67). In particular, the students perceived an improvement in the quality of supervision strategies and a higher involvement of the supervisor in terms of the clinical reasoning underlying care decisions. In the clinical learning environment, “personalisation”, which is considered to place emphasis on opportunities for individual students to interact with their clinical supervisors, is a key factor that influences student satisfaction. Indeed, satisfaction is higher when students feel included and supported in their learning (68,69).

Previous studies have suggested that students with a personal preceptor had a more positive experience of the supervisory relationship and of their clinical placement, and students had appreciated the possibility of building engaging and trusting relationship with their clinical teachers (28,30,31,70). In our study the adoption of the individualized supervision model, which was widespread during the COVID-19 pandemic so as to avoid overcrowding and limit contact, may have facilitated the student/supervisor relationship. Students value continuity during their clinical placement and this continuity is enhanced when students and their supporters share the same work roster (8). We found that the CLE during the clinical training period of the COVID-19 pandemic offered the students more learning opportunities and an adequate level of responsibility for their role. Clinical learning and teaching during the global pandemic have made it possible to extend knowledge and expose students to rapid changes in the healthcare system so as to cope with emergencies (71). Students in clinical placements had to adapt constantly to these new procedures, the revision of spaces for the reconfigured units, personal protective equipment and the continuous improvement of infection control procedures (72). Such clinical training experience has generated a profound change in the learning process: in addition to skills, professional and personal growth have also been stimulated (73). Moreover, the sense of belonging to and integration within the team and the perception of students' "usefulness" in providing nursing care have generated high motivation levels among students and a limited intention to leave studies (13). Additionally, based on the CLES+T scale, the level of overall satisfaction among the students was higher during the pandemic period with the individualized supervision model. These findings are consistent with those of other studies, which have indicated that students with the same preceptor throughout the placement had more positive perceptions of the CLE (20,32,29,64), but in contrast, a comparative study reported that the respondents preferred the "preceptor of the day" in which the preceptor may change from day to day (6,74). In our study, the rating of "Pedagogical Atmosphere" dimension increased significantly with the one-to-one model in regard to the scale items and students felt

comfortable taking part in discussions within the team. It can be argued that students' need to feel heard, prepared and supported and have a clear need for interaction with their supervisor throughout the clinical internship, which was met during the COVID-19 pandemic (75). Good mentorship is essential for the support of students and the avoidance of stress and related issues (33). A recent systematic review and meta-synthesis suggested that, during the pandemic period, a psychologically safe environment, supportive practice environment, and supportive social network were crucial in assisting in the transition process of nursing students during clinical placements (76). In our sample, the "Supervisory relationship" dimension scored very highly with the individualized supervision model, even if there was no statistically significant difference. The dimension "Leadership style of the ward manager", which had the lowest average score among the five dimensions in the pre-pandemic era, was significantly increased in the second survey because the WM was perceived more as a team member and his or her feedback could easily be considered in a learning situation. Hence, as suggested by some authors, the leadership style of the WM remains a key element of experiential learning in clinical settings (43,64,77). According to a recent study, the ward manager's leadership style exerts a significant influence on the clinical learning environment via his/her support of an effective pedagogical atmosphere and, consequently, effective mentoring (78). In our study, with the individualized supervision model there was greater satisfaction with the collaboration between the NT and the clinical team in supporting the student's learning. In accordance with Bisholt et al. (2014), we determined that to achieve a good learning environment within each clinical placement, close cooperation between nursing education staff, clinical staff and the ward manager must be achieved (9). Finally, the dimensions "Safety and quality of nursing care" (CLEQI) and "Premises of nursing care on the ward" (CLES+T) achieved the highest scores among the investigated dimensions, values that significantly increased with the implementation of one-to-one clinical supervision model during the pandemic period. As the quality of the learning environment affects the success of clinical training, the results of this study should be considered

in the programming of clinical placements, because satisfactory clinical learning environments and supervision will support the development of students' clinical competence and have significant effects on the outcomes of students' experiences (16,64,79-81).

Conclusions

There are some limitations to this study that must be acknowledged. This retrospective study compared the perceptions of students collected in two periods of clinical training organized in two different academic years, one of which was characterized by the COVID-19 pandemic. The need to reorganize clinical training due to the pandemic led us to experiment with a new model of clinical supervision. On the other hand, we cannot exclude that this health event may have influenced the data collected in the second survey. Future research should investigate whether the appreciation for the individualized supervision model will still be true in a non-pandemic context, possibly with multicenter studies.

Furthermore, two different student response rates were detected between the 2018/19 academic year and the 2019/20 academic year, it can be hypothesized that the second was probably lower due to the pandemic context.

However, this study has two important strengths, being one of the few studies to compare nursing students' perceptions of CLEs based on two different clinical supervision models. Moreover, the study has the added value of having used two validated and established instruments, enabling a comparison of the quality of CLE both nationally and internationally.

In this study, nursing students reported high levels of CLE quality with both supervision models, even though the individualized supervision model was rated significantly higher by students than the nursing staff supervision model. Students supported by a personal supervisor during their clinical training had a more positive experience and ranked the quality of the tutorial strategies, learning opportunities, safety and nursing care quality, leadership style of the ward manager and overall CLE more highly. In the case of the one-to-one model, respondents particularly appreciated the

fact that the supervisor explained the clinical thinking underlying clinical decisions and that the supervisor's final evaluation was consistent with the feedback they received during their clinical experiences. With this model, satisfaction with the collaboration between the nurse teacher and the clinical team in supporting student learning was also increased, confirming the need for close collaboration between educational staff, clinical staff and the manager to create a positive CLE. Considering that providing high-quality clinical education experiences is an important focus of nursing educators that impacts on the development of professional skills and retention of nursing students, we hope that the study's results will contribute to the analysis of the conditions that create good clinical learning environments.

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Conflict of Interest: each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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