



## Nursing students' involvement in shift-to-shift handovers: Findings from a national study



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### ABSTRACT

**Background:** Effective performance of clinical handovers should be one of the priorities of nursing education to promote efficient communication skills and ensure patient safety. However, to date, no studies have explored to what extent nursing students are involved in handovers.

**Objective:** To explore nursing students' handover involvement during their clinical rotations and associated factors.

**Method:** This was a secondary analysis of a large national cross-sectional study that involved 9607 undergraduate nursing students in 27 universities across 95 three-year Italian baccalaureate nursing programs. The involvement in the clinical handovers was the end point (from 0, never, to 3, always). A path analysis was performed to identify variables directly and indirectly affecting students' handover involvement.

**Results:** Handover involvement was reported as 'only a little', 'to some extent', and 'always' by 1739 (18.1%), 2939 (30.6%), and 4180 (43.5%) students, respectively; only 749 (7.8%) of students reported never being involved. At the path analysis explaining the 19.1% of variance of nursing students' involvement, some variables emerged that directly increased the likelihood of being involved in handovers. These were being female ( $\beta = 0.115$ ,  $p < 0.001$ ); having children ( $\beta = 0.107$ ,  $p = 0.011$ ); being a 3rd-year student ( $\beta = 0.142$ ,  $p < 0.001$ ) and being a 2nd-year student as compared to a 1st-year student ( $\beta = 0.050$ ,  $p = 0.036$ ); and having a longer clinical rotation ( $\beta = 0.015$ ,  $p < 0.001$ ) in units with high 'quality of the learning environment' ( $\beta = 0.279$ ,  $p < 0.001$ ). Moreover, students who were supervised by the nurse teacher ( $\beta = -0.279$ ,  $p < 0.001$ ), or by a nurse on a daily basis ( $\beta = -0.253$ ,  $p = 0.004$ ), or by the staff ( $\beta = -0.190$ ,  $p < 0.001$ ) reported being less involved in handovers as compared to those students supervised by a clinical nurse. Variables with indirect effects also emerged (model of student's supervision adopted at the unit level, and number of previous clinical rotations attended by students). Moreover, handover involvement explained 11.5% of students self-reported degree of competences learned during the clinical experience.

**Conclusions:** Limiting students' opportunity to be involved in handover can prevent the development of communication skills and the professional socialization processes. Strategies at different levels are needed to promote handover among undergraduate nursing students.

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## 1. Introduction

Clinical handover occurs between one or more staff member(s) who have undertaken the responsibility for care, and one or more staff member(s) who will assume the responsibility of the patient's care (Anderson et al., 2015; Bradley and Mott, 2014; Tobiano et al., 2017; Watson et al., 2014). According to the different patients' care transitions, handovers can be shift-to-shift, nurse(s)-to-physician(s), physician(s)-to-nurse(s), ward-to-ward, or hospital-to-community, with shift-to-shift handovers documented as the most frequent occurrence of > 15 times during a 5-day hospitalization (Merten et al., 2017). Moreover, handover can be performed in a room away from patients or at the bedside, with the latter promoting patient-centred care and increasing patients' and nurses' satisfaction (Bertoldi and Celi, 2017).

An effective handover has been reported as a key factor in ensuring patient safety (Anderson et al., 2015). However, communication issues (e.g., omission in reporting or unreliable exchange of information) have been documented as among the greatest daily concerns of nurses (Moss et al., 2017), which also affect patient outcomes. Failures in handover communication have been estimated to be responsible for about 40% of adverse events, such as treatment errors, surgery on the wrong area, or patient death (Manias et al., 2016); moreover, around 22% of adverse events associated with nursing care (e.g., administering a wrong medication) have been associated with poor communication during handovers (Tran and Johnson, 2010). Therefore, from the clinical practice perspective, several international institutions have recognized clinical handover as a priority area for improvement (e.g., Joint Commission for Accreditation, 2017; WHO Collaborating Centre for Patient Safety Solutions, 2007). However, from the nursing education perspective, where communication skills and methods of handovers should be effectively considered, little attention has been paid to date on the quality of handover as experienced by students (e.g., Jarvelainen et al., 2018; Yu and Kang, 2017), while no studies on the degree to which students are involved on a daily basis in handovers or factors promoting their involvement have been documented to date.

There is growing recognition that it is essential to promote nursing students' communication skills, allowing them to gain early experience in clinical handover prior to being assigned the responsibility of patient care. However, a few students have been documented to learn handover skills by simulation in a supported educational environment (Malone et al., 2016), by workshops including handover observation and receiving feedback from faculty members (Stojan et al., 2016), or by teaching sessions that include watching video with positive or negative examples of handover followed by guided discussion (Lee et al., 2016). The majority of students have been documented as not having received formal teaching regarding how to perform handover communication (Skaalvik et al., 2010), and on-the-job training represents the main learning strategy (Malone et al., 2016). In the clinical environment, nursing students may gain experience by being involved in the process of clinical handover, witnessing and listening to handover examples, or conducting handovers at the end of shifts (Lee et al., 2016). However, practising handover in a clinical environment is not always possible: in a pre-post study involving 47 US nursing students, a lack of experience in giving formal handover reports was reported as common (Lee et al., 2016); moreover, dissatisfaction with handovers due to the lack of professional discussions emerged as a theme in a qualitative study involving 12 third-year nursing students (Skaalvik et al., 2010). Similarly, in other health care professionals, according to a survey involving 145 third-year US medical students, only 39% of them reported being assisted in written sign outs, only 26% had given verbal handovers, and only 21% had received verbal handovers during clinical rotations (Arora et al., 2013).

In the present study, we aimed to explore nursing students' handover involvement during their clinical learning rotations and associated factors. Research questions were the following:

- 1) Are nursing students involved in shift-to-shift handover during their clinical rotations?
- 2) Which factors directly and indirectly affect the students' involvement in handover?
- 3) Does handover involvement affect the degree of competence achieved in the clinical context, as perceived by students?

## 2. Methods

### 2.1. Design

This is a secondary analysis of data collected inside a large national cross-sectional study performed in 2015–2016 (Palese et al., 2016) and reported here according to the STrengthening the Reporting of OBservational studies in Epidemiology project for cross-sectional studies (Supplementary data, von Elm et al., 2008) and the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) (Eysenbach, 2004).

### 2.2. Setting and Participants

For the primary study, an Italian network of Bachelor of Nursing Science (BNS) degree programs was created by involving all existing nursing programmes at the national level. Thus, the Coordinator Centre launched an open call to participate that was sent to all 208 BNS programmes located in 43 universities spread across the 20 regions. The invitation was closed after two months, in total enrolling 27 universities with 95 BNS degrees in 15 regions (Palese et al., 2016).

The target population was all nursing students attending the involved nursing programme. Inclusion criteria included students who a) were attending or had just completed their clinical learning rotation at the moment of the survey; b) had experienced their rotation in the same unit or department for at least two weeks; and c) were willing to participate in the study.

### 2.3. Variables, Instrument and Data Collection Process

The involvement in shift-to-shift clinical handovers by giving or receiving handovers (hereafter 'handover') in the last clinical rotation was the primary end point of the study, assessed through the following item included in the questionnaire: 'Were you involved in clinical handover(s) by giving or receiving shift-to-shift handovers during your last clinical learning rotation?'. Answers were based upon a 4-point Likert scale (0 = 'not at all', 1 = 'only a little', 2 = 'to some extent', and 3 = 'always').

The questionnaire included further explanatory variables at the individual, unit, and outcome levels as reported in Table 1.

The questionnaire was piloted in one nursing degree program by involving 100 students to ensure feasibility and understandability. No changes were suggested, and the data collected were not included in this final analysis. Moreover, the Coordinator Centre agreed with the research team that the strategies to be used in data collection provided differences in the resources available in each nursing programme. Therefore, the questionnaire was distributed and students completed it via hard copy or online, according to local resources. The data collection process was launched in the second semester 2015 and ended in the first semester 2016; strategies to prevent bias have been applied as reported in Table 2 and the Supplementary Table 1.

### 2.4. Data Analysis

Descriptive and inferential statistical analysis was performed (SPSS Statistical Package version 24 and R Core Team, 2017), by computing frequencies, percentages, and averages (with Standard Deviations [SD] and ranges; or confidence intervals [CI] at 95%).

A bivariate analysis was performed by considering the primary end point as a categorical variable forming four groups: students who

**Table 1**  
Variables collected at the individual, unit and at the outcome level.

- *Individual level:* This included socio-demographic variables (e.g., age, gender) and working experiences both previously and during nursing education.
  - *Individual level, as a nursing student:* This included the year of nursing education attended (1st, 2nd, or 3rd and final year); the amount of previous clinical learning experience attended (clinical rotations, in number); and in which settings the experience occurred (e.g., only in hospital, only in the community setting, or in both).
  - *Unit level:* with regard to the last clinical rotation, students were asked about its duration (weeks) and the supervision model adopted by the unit under the following possible solutions used in the Italian context (Brugnolli and Benaglio, 2017):
    - (a) under the guidance of a clinical nurses called ‘clinical supervisor’ who has the responsibility of both patients’ care and student(s)’ learning processes for the entire clinical rotation;
    - (b) under the guidance of the entire staff who have all the responsibility of both patients’ care and student(s)’ learning processes;
    - (c) under the guide of a nurse identified on a daily basis by the head nurse who has the responsibility of both patients’ care and student(s)’ learning processes for the entire day;
    - (d) under the guide of the nurse teacher appointed at the university level, and spending some hours a day in the clinicals setting, and
    - (e) under the guide of the head nurse who has the responsibility of both managerial issues and student(s)’ learning processes, for the entire clinical rotation.
- Moreover, the Clinical LEarning Quality Evaluation Index (CLEQI) tool was employed to assess the perceived quality of the learning processes enacted in the specific environment of the unit (Palese et al., 2017). The tool comprises five factors: ‘quality of the tutorial strategies’ (6 items), ‘learning opportunities’ (6 items), ‘self-directed learning’ (3 items), ‘safety and nursing care quality’ (4 items), and ‘quality of the learning environment’ (3 items). Each factor as well as the overall CLEQI score may range from 0 to 3, with higher scores indicating a higher quality of the learning processes enacted in the clinical setting, as perceived by students. The psychometric properties of the tool have been published elsewhere (Palese et al., 2017).
- *Outcome level:* this included the degree of competence learned in the last clinical experience as perceived by each student (4-point Likert scale, from 0, none, to 3, very much).

**Table 2**  
Bias control and levels

- (a) Selection bias prevention - at the national level: an open invitation was sent three different times, at two-week intervals, to involve as many BNS programmes as possible.
- (b) Information bias prevention - at the nursing programme level: there were ensured the following strategies: a) data collection was performed after standardized information was offered to all participants by those responsible for data collection at the BNS level; b) students were free to participate with neither benefits nor pressure; and c) study aims and data collection procedures were described at the beginning of the questionnaire as well as in a sheet sent to those responsible for each BNS degree programme.
- (c) Recall bias prevention - at the student level: students were invited to fill in the questionnaire during the last week of the clinical training or at least within the following two weeks, during which time no other clinical placements were initiated. With regard to the data collection process, both hard-copy and online questionnaires were completed. With regard to online data collection, we have strictly followed the good practice procedures as reported in Supplementary Table 1 (Eysenbach, 2004).

experienced handover involvement as ‘not at all’, ‘only a little’, ‘to some extent’, and ‘always’. A chi-square test, ANOVA, and Kruskal-Wallis test were used to explore differences among groups, according to the nature of the variables.

The Intra Class Correlation (ICC) was computed both under random and fixed effects to identify the clusters effect at the unit level (e.g., students may be engaged in handover to a different extent according to the specific unit—intensive care unit vs. medical unit) and at the nursing programme level (e.g., BNS degree programmes can have different strategies to promote handover involvement of students by asking the wards to offer this opportunity).

Then, a path analysis was performed by introducing the end point as outcome and as explanatory variables. Variables included those

significantly associated with the end point in the bivariate analysis; there were selected individual variables as exogenous variables—not influenced by variables introduced in the causal model; and there also were endogenous variables—those that emerged in the bivariate analysis as being associated with the outcome, as well as in previous studies (Palese et al., 2018a, 2018b, 2018c). Thus, direct and indirect effects by sequential multiple regression analyses were tested. The standardized coefficient  $\beta$  was estimated for each variable and, according to Tarling (2009), we also accounted for the total effect by multiplying the path coefficients connecting the causal variable to the outcomes. The entire model was also estimated regarding the total variance of the outcome ( $R^2$ ). Moreover, at the outcome level, the impact of handover involvement on the degree of competence achieved by students as self-perceived was also introduced in the model by using a linear regression analysis by calculating the  $R^2$ .

The statistical significance was set at  $p < 0.05$ .

### 2.5. Ethics

Ethical approval was obtained from the University of Milan (Italy). Participation was voluntary, there was no incentive for the students to enter the study, and each student signed a written informed content.

## 3. Results

### 3.1. Participants and End Point

A total of 9607 (91.7%) out of the 10,480 undergraduate nursing students invited to participate completed the questionnaire. Handover involvement was reported ‘only a little’, ‘to some extent’, and ‘always’ by 1739 (18.1%), 2939 (30.6%) and 4180 (43.5%) students, respectively; only 749 (7.8%) students reported not having ever been involved in handovers.

### 3.2. Bivariate Analysis

At the individual level (Table 3), students who were always involved in handovers were more often female ( $p = 0.006$ ) and less often had children ( $p = 0.003$ ). Instead, those students who were never involved in handovers more often attended a high secondary school ( $p = 0.013$ ).

At the nursing programme level, students who were always involved in handovers reported fewer previous clinical experiences ( $p < 0.001$ ); at the unit level, they were more often supervised by a clinical nurse and reported a longer duration of clinical rotation ( $p < 0.001$ ). They also reported higher average scores both in all factors ( $p < 0.001$ ) and in the total CLEQI score ( $p < 0.001$ ).

At the outcome level, students who were always involved in handovers reported having learnt more competences ( $p < 0.001$ , Table 3) as compared with other groups.

At the unit level, handover involvement accounted for an ICC of 0.10 (random effects) and 0.05 (fixed effects); at the nursing programme level, the ICC was 0.22 (both with random and fixed effects).

### 3.3. Path Analysis

As reported in Table 4, at the individual level, being female ( $\beta = 0.115$ ,  $p < 0.001$ ) and having children ( $\beta = 0.107$ ,  $p = 0.011$ ) directly increased the likelihood of being involved in handovers. Similarly, being a 3rd-year student as compared to a 1st-year student ( $\beta = 0.142$ ,  $p < 0.001$ ) and being a 2nd-year student as compared to a 1st-year student ( $\beta = 0.050$ ,  $p = 0.036$ ) both directly increased the likelihood of handover involvement. In contrast, the lower number of previous clinical rotations attended by students slightly prevented handover involvement ( $\beta = -0.041$ ,  $p < 0.001$ ).

With regard to the most recent clinical rotation attended, its

**Table 3**  
Handover involvement as experienced by nursing students during their most recent clinical rotation.

|   | Not at all<br>N = 749 (7.8%) | Only a little<br>N = 1739 (18.1%) | To some extent<br>N = 2939 (30.6%) | Always<br>N = 4180 (43.5) | p-value <sup>c</sup> |
|---|------------------------------|-----------------------------------|------------------------------------|---------------------------|----------------------|
| <b>Individual level</b>   |                              |                                   |                                    |                           |                      |
| Age, years, mean (95% CI)   | 23.14 (22.82–23.45)          | 22.94 (22.74–23.14)               | 22.93 (22.77–23.08)                | 22.81 (22.68–22.93)       | 0.201                |
| Female gender (n = 9596), n (%)   | 542 (72.5)                   | 1292 (74.3)                       | 2234 (76.2)                        | 3235 (77.4)               | 0.006                |
| Civil status, n (%)   |                              |                                   |                                    |                           | 0.152                |
| Unmarried   | 707 (94.4)                   | 1644 (94.5)                       | 2775 (94.4)                        | 3919 (93.8)               |                      |
| Married/cohabitant  | 28 (3.7)                     | 70 (4.0)                          | 123 (4.2)                          | 214 (5.1)                 |                      |
| Divorced  | 3 (0.4)                      | 5 (0.3)                           | 10 (0.3)                           | 19 (0.4)                  |                      |
| Widowed   | 0 (–)                        | 1 (0.1)                           | 2 (0.1)                            | 4 (0.1)                   |                      |
| Missing   | 11 (1.5)                     | 19 (1.1)                          | 29 (1.0)                           | 24 (0.6)                  |                      |
| With children, n (%)  | 25 (3.4)                     | 59 (3.5)                          | 122 (4.2)                          | 222 (2.3)                 | 0.003                |
| Secondary education (n = 9442), n (%)   |                              |                                   |                                    |                           | 0.013                |
| High school   | 550 (74.3)                   | 1201 (69.8)                       | 1985 (68.9)                        | 2894 (70.6)               |                      |
| Technical school  | 22 (3.0)                     | 88 (5.1)                          | 135 (4.7)                          | 165 (4.0)                 |                      |
| Professional school   | 114 (15.4)                   | 281 (16.3)                        | 458 (15.9)                         | 665 (16.2)                |                      |
| Teacher school  | 41 (5.5)                     | 137 (8.0)                         | 264 (9.2)                          | 326 (7.9)                 |                      |
| Secondary school abroad   | 13 (1.8)                     | 13 (0.8)                          | 37 (1.3)                           | 33 (1.3)                  |                      |
| Previous academic experience (n = 9515), n (%)  |                              |                                   |                                    |                           | 0.065                |
| None  | 494 (66.6)                   | 1162 (67.8)                       | 2006 (69.0)                        | 2925 (70.4)               |                      |
| Graduated in other fields   | 27 (3.6)                     | 73 (4.3)                          | 125 (4.3)                          | 195 (4.7)                 |                      |
| Uncompleted degree  | 218 (29.3)                   | 457 (26.7)                        | 752 (25.8)                         | 999 (24.1)                |                      |
| Other   | 4 (0.5)                      | 20 (1.2)                          | 26 (0.9)                           | 32 (0.8)                  |                      |
| Secondary education grade score (n = 9312), mean (95% CI)   |                              |                                   |                                    |                           |                      |
| On a 100-point scale (n = 9108, 94.8%)  | 55.52 (76.55–78.29)          | 76.99 (76.49–77.50)               | 76.93 (76.55–77.30)                | 76.66 (76.34–76.97)       | 0.179                |
| On a 60-point scale (n = 172, 1.8%)   | 44.13 (40.13–48.49)          | 45.06 (42.20–47.92)               | 45.52 (43.55–47.50)                | 45.75 (44.05–47.46)       | 0.897                |
| On a 10-point scale (n = 32, 0.4%)  | 7.60 (5.02–10.18)            | 8.00 (6.70–9.30)                  | 7.84 (6.92–8.75)                   | 7.84 (7.03–8.66)          | 0.984                |
| Previous work experience (n = 9553), n (%)  | 247 (33.3)                   | 586 (33.9)                        | 987 (33.8)                         | 1481 (35.6)               | 0.314                |
| <b>Nursing programme level</b>  |                              |                                   |                                    |                           |                      |
| Academic year attended (n = 9579), n (%)  |                              |                                   |                                    |                           | 0.061                |
| First   | 234 (31.5)                   | 494 (28.6)                        | 847 (28.9)                         | 1334 (32.0)               |                      |
| Second  | 248 (33.5)                   | 609 (35.2)                        | 1014 (34.5)                        | 1411 (33.8)               |                      |
| Third   | 259 (35.0)                   | 627 (36.2)                        | 1074 (36.6)                        | 1428 (34.2)               |                      |
| Work experience during the degree (n = 9526), n (%)   | 150 (20.2)                   | 323 (18.8)                        | 589 (20.2)                         | 880 (21.2)                | 0.202                |
| Previous clinical experiences, (n = 9498), number, mean (95% CI)  | 5.62 (5.35–5.88)             | 5.34 (5.17–5.50)                  | 5.01 (4.89–5.13)                   | 4.53 (4.44–4.62)          | < 0.001              |
| Settings (n = 9551), n (%)  |                              |                                   |                                    |                           | 0.247                |
| Only hospital   | 525 (70.6)                   | 1204 (69.7)                       | 1965 (67.4)                        | 2812 (67.6)               |                      |
| Only community setting  | 10 (1.3)                     | 24 (1.4)                          | 42 (1.4)                           | 77 (1.9)                  |                      |
| Hospital and community setting  | 209 (28.1)                   | 499 (28.9)                        | 911 (31.2)                         | 1273 (30.5)               |                      |
| <b>Unit level</b>   |                              |                                   |                                    |                           |                      |
| Length of the most recent clinical experience, weeks, mean (95% CI) <sup>a</sup>                        | 5.13 (4.93–5.34)             | 5.57 (5.43–5.72)                  | 5.82 (5.72–5.93)                   | 6.02 (5.94–6.09)          | < 0.001              |
| Tutorial model of the more recent clinical experience (n = 9563), n (%) <sup>a</sup>                    |                              |                                   |                                    |                           | < 0.001              |
| I was supervised by a clinical nurse  | 218 (29.3)                   | 664 (38.4)                        | 1547 (53.0)                        | 2667 (63.9)               |                      |
| I was supervised by the nursing staff   | 449 (60.4)                   | 924 (53.5)                        | 1161 (39.7)                        | 1270 (30.5)               |                      |
| I was supervised by nurse identified on a daily basis by the head nurse                                 | 11 (1.5)                     | 22 (1.3)                          | 33 (1.1)                           | 27 (0.6)                  |                      |
| I was supervised by the nurse teacher   | 57 (7.7)                     | 97 (5.6)                          | 128 (4.4)                          | 123 (2.9)                 |                      |
| I was supervised by the head nurse  | 8 (1.1)                      | 20 (1.2)                          | 52 (1.8)                           | 85 (2.1)                  |                      |
| CLEQI factor scores, mean (95% CI) <sup>a,b</sup>   |                              |                                   |                                    |                           |                      |
| Quality of the tutorial strategies  | 1.29 (1.23–1.35)             | 1.60 (1.23–1.63)                  | 1.88 (1.86–1.90)                   | 2.31 (2.29–2.33)          | < 0.001              |
| Learning opportunities  | 1.41 (1.36–1.46)             | 1.60 (1.57–1.63)                  | 1.85 (1.83–1.87)                   | 2.30 (2.29–2.32)          | < 0.001              |
| Self-directed learning  | 0.88 (0.82–0.93)             | 1.17 (1.14–1.21)                  | 1.43 (1.41–1.46)                   | 1.80 (1.78–1.82)          | < 0.001              |
| Safety and nursing care quality   | 1.63 (1.58–1.67)             | 1.77 (1.74–1.79)                  | 1.97 (1.95–1.99)                   | 2.36 (2.34–2.37)          | < 0.001              |
| Quality of the learning environment   | 1.31 (1.26–1.36)             | 1.63 (1.60–1.66)                  | 1.90 (1.88–1.93)                   | 2.40 (2.38–2.41)          | < 0.001              |
| Overall CLEQI score <sup>a,b</sup>  | 1.31 (1.26–1.35)             | 1.56 (1.53–1.58)                  | 1.81 (1.79–1.83)                   | 2.24 (2.22–2.25)          | < 0.001              |
| <b>Outcome level</b>  |                              |                                   |                                    |                           |                      |
| Degree competence learned the most recent clinical experience, (n = 9577), mean (95% CI) <sup>a,b</sup> | 1.52 (1.47–1.58)             | 1.79 (1.75–1.82)                  | 2.00 (1.97–2.02)                   | 2.34 (2.32–2.36)          | < 0.001              |

CI, confidence interval; CLEQI, Clinical Learning Quality Evaluation Index; SD, standard deviation.

<sup>a</sup> The last clinical experience was that under evaluation.

<sup>b</sup> On a 4-point Likert scale (0 = “never” 3 = “always” for the CLEQI; 0 “none”; 3 = “very much” for the outcome level).

<sup>c</sup> Chi square for dichotomous variables, analysis of variance and Kruskal-Wallis test for continuous variables.

duration in weeks also directly increased the likelihood of being involved in handovers ( $\beta = 0.015$ ,  $p < 0.001$ ) as did the ‘quality of the learning environment’ ( $\beta = 0.279$ ,  $p < 0.001$ ), ‘learning opportunities’ ( $\beta = 0.208$ ,  $p < 0.001$ ), ‘safety and care quality’ ( $\beta = 0.190$ ,  $p < 0.001$ ), ‘quality of the tutorial strategies’ ( $\beta = 0.066$ ,  $p = 0.001$ ), and ‘opportunity of self-directed learning’ ( $\beta = 0.042$ ,  $p = 0.004$ ) factors as measured with the CLEQI tool.

The model of student supervision adopted in the unit also had a direct effect on handovers' involvement: students who had been

supervised by the nurse teacher ( $\beta = -0.279$ ,  $p < 0.001$ ), by a nurse on a daily basis ( $\beta = -0.253$ ,  $p = 0.004$ ), or by the entire staff ( $\beta = -0.190$ ,  $p < 0.001$ ) were less involved in handovers as compared to those students supervised by a clinical supervisor.

Specifically, in the context of indirect relationships among variables, the ‘quality of the learning environment’ has been reduced by being supervised by the staff ( $\beta = -0.331$ ,  $p < 0.001$ ), by a nurse on a daily basis ( $\beta = -0.306$ ,  $p < 0.001$ ), or by the nurse teacher ( $\beta = -0.302$ ,  $p < 0.001$ ) as compared to being supervised by a

**Table 4**  
Being involved in shift-to-shift handovers in my last clinical rotation: path-analysis.

|  | $\beta$  | Std.Err | z-value | P(>  z ) | Std.lv | Std.all |
|--|----------|---------|---------|----------|--------|---------|
| Outcome: being involved in handovers (from 0 to 3) <sup>a,b</sup>                                  |          |         |         |          |        |         |
| Gender F vs M  | 0.115    | 0.020   | 5.719   | 0.000    | 0.115  | 0.056   |
| Having child(s)  | 0.107    | 0.042   | 2.544   | 0.011    | 0.107  | 0.025   |
| 2nd year vs 1st  | 0.050    | 0.024   | 2.094   | 0.036    | 0.050  | 0.027   |
| 3rd year vs 1st  | 0.142    | 0.032   | 4.465   | 0.000    | 0.142  | 0.078   |
| High secondary education vs technical/professional   | -0.016   | 0.019   | -0.862  | 0.389    | -0.016 | -0.008  |
| Previous university experience(s)  | -0.015   | 0.018   | -0.818  | 0.413    | -0.015 | -0.008  |
| Number of clinical rotations attended  | -0.041   | 0.004   | -10.314 | 0.000    | -0.041 | -0.152  |
| Duration of the last clinical rotation (in weeks)  | 0.015    | 0.003   | 4.465   | 0.000    | 0.015  | 0.045   |
| I was supervised by the nursing staff vs a CS  | -0.190   | 0.019   | -10.081 | 0.000    | -0.190 | -0.106  |
| I was supervised by nurse identified on a daily basis by the head nurse vs a CS                    | -0.253   | 0.088   | -2.867  | 0.004    | -0.253 | -0.028  |
| I was supervised by the nurse teacher vs a CS  | -0.279   | 0.044   | -6.390  | 0.000    | -0.279 | -0.063  |
| I was supervised by the head nurse vs a CS   | -0.054   | 0.067   | -0.807  | 0.420    | -0.054 | -0.008  |
| Quality of the tutorial strategies   | 0.066    | 0.020   | 3.299   | 0.001    | 0.066  | 0.056   |
| Self-directed learning   | 0.042    | 0.015   | 2.887   | 0.004    | 0.042  | 0.038   |
| Learning opportunities   | 0.208    | 0.022   | 9.514   | 0.000    | 0.208  | 0.160   |
| Safety and nursing care quality  | 0.190    | 0.020   | 9.343   | 0.000    | 0.190  | 0.129   |
| Quality of the learning environment  | 0.279    | 0.019   | 14.942  | 0.000    | 0.279  | 0.235   |
| Outcome: quality of the tutorial strategies (from 0 to 3) <sup>a,c</sup>                           |          |         |         |          |        |         |
| Previous university experience(s)  | -0.027   | 0.016   | -1.653  | 0.098    | -0.027 | -0.017  |
| Number of clinical rotations attended  | 0.000    | 0.002   | 0.118   | 0.906    | 0.000  | 0.001   |
| Duration of the last clinical rotation (in weeks)  | 0.016    | 0.003   | 5.564   | 0.000    | 0.016  | 0.059   |
| I was supervised by the nursing staff vs a CS  | -0.422   | 0.016   | -26.437 | 0.000    | -0.422 | -0.279  |
| I was supervised by nurse identified on a daily basis by the head nurse vs a CS                    | -0.272   | 0.079   | -3.442  | 0.001    | -0.272 | -0.036  |
| I was supervised by the nurse teacher vs a CS  | -0.355   | 0.039   | -9.152  | 0.000    | -0.355 | -0.096  |
| I was supervised by the head nurse vs a CS   | 0.145    | 0.059   | 2.470   | 0.014    | 0.145  | 0.026   |
| Outcome: Self-directed learning (from 0 to 3) <sup>a,c</sup>                                       |          |         |         |          |        |         |
| Previous university experience(s)  | -0.032   | 0.018   | -1.773  | 0.076    | -0.032 | -0.018  |
| Number of clinical rotations attended  | -0.004   | 0.003   | -1.689  | 0.091    | -0.004 | -0.018  |
| Duration of the last clinical rotation (in weeks)  | 0.016    | 0.003   | 5.087   | 0.000    | 0.016  | 0.054   |
| I was supervised by the nursing staff vs a CS  | -0.400   | 0.017   | -22.915 | 0.000    | -0.400 | -0.244  |
| I was supervised by nurse identified on a daily basis by the head nurse vs a CS                    | -0.120   | 0.087   | -1.382  | 0.167    | -0.120 | -0.014  |
| I was supervised by the nurse teacher vs a CS  | -0.283   | 0.042   | -6.650  | 0.000    | -0.283 | -0.070  |
| I was supervised by the head nurse vs a CS   | 0.109    | 0.064   | 1.691   | 0.091    | 0.109  | 0.018   |
| Outcome: learning opportunities (from 0 to 3) <sup>a,c</sup>                                       |          |         |         |          |        |         |
| Previous university experience(s)  | -0.024   | 0.015   | -1.549  | 0.121    | -0.024 | -0.016  |
| Number of clinical rotations attended  | 0.014    | 0.002   | 6.181   | 0.000    | 0.014  | 0.066   |
| Duration of the last clinical rotation (in weeks)  | 0.019    | 0.003   | 6.968   | 0.000    | 0.019  | 0.074   |
| I was supervised by the nursing staff vs a CS  | -0.302   | 0.015   | -20.357 | 0.000    | -0.302 | -0.218  |
| I was supervised by nurse identified on a daily basis by the head nurse vs a CS                    | -0.203   | 0.074   | -2.762  | 0.006    | -0.203 | -0.029  |
| I was supervised by the nurse teacher vs a CS  | -0.274   | 0.036   | -7.576  | 0.000    | -0.274 | -0.080  |
| I was supervised by the head nurse vs a CS   | -0.129   | 0.055   | -2.361  | 0.018    | -0.129 | -0.025  |
| Outcome: safety and nursing care quality (from 0 to 3) <sup>a,c</sup>                              |          |         |         |          |        |         |
| Previous university experience(s)  | -0.029   | 0.014   | -2.171  | 0.030    | -0.029 | -0.023  |
| Number of clinical rotations attended  | -0.001   | 0.002   | -0.717  | 0.473    | -0.001 | -0.008  |
| Duration of the last clinical rotation (in weeks)  | 0.006    | 0.002   | 2.714   | 0.007    | 0.006  | 0.029   |
| I was supervised by the nursing staff vs a CS  | -0.267   | 0.013   | -20.366 | 0.000    | -0.267 | -0.219  |
| I was supervised by nurse identified on a daily basis by the head nurse vs a CS                    | -0.177   | 0.065   | -2.728  | 0.006    | -0.177 | -0.029  |
| I was supervised by the nurse teacher vs a CS  | -0.199   | 0.032   | -6.224  | 0.000    | -0.199 | -0.066  |
| I was supervised by the head nurse vs a CS   | 0.056    | 0.048   | 1.155   | 0.248    | 0.056  | 0.012   |
| Outcome: quality of the learning environment (from 0 to 3) <sup>a,c</sup>                          |          |         |         |          |        |         |
| Previous university experience(s)  | -0.055   | 0.017   | -3.276  | 0.001    | -0.055 | -0.034  |
| Number of clinical rotations attended  | -0.007   | 0.002   | -2.831  | 0.005    | -0.007 | -0.030  |
| Duration of the last clinical rotation (in weeks)  | 0.021    | 0.003   | 7.314   | 0.000    | 0.021  | 0.078   |
| I was supervised by the nursing staff vs a CS  | -0.331   | 0.016   | -20.517 | 0.000    | -0.331 | -0.220  |
| I was supervised by nurse identified on a daily basis by the head nurse vs a CS                    | -0.306   | 0.080   | -3.821  | 0.000    | -0.306 | -0.040  |
| I was supervised by the nurse teacher vs a CS  | -0.302   | 0.039   | -7.682  | 0.000    | -0.302 | -0.081  |
| I was supervised by the head nurse vs a CS   | 0.065    | 0.059   | 1.096   | 0.273    | 0.065  | 0.012   |
| Outcome: degree of competence learned in the last clinical experience (from 0 to 3) <sup>a,d</sup> |          |         |         |          |        |         |
| Being involved in handovers  | 0.282    | 0.008   | 36.322  | 0.000    | 0.282  | 0.339   |
|  | Estimate | Std.Err | z-value | P(>  z ) | Std.lv | Std.all |
| Intercepts   |          |         |         |          |        |         |
| Being involved in handovers  | 0.614    | 0.048   | 12.692  | 0.000    | 0.614  | 0.703   |
| Quality of the tutorial strategies   | 2.080    | 0.025   | 83.908  | 0.000    | 2.080  | 2.822   |
| Self-directed learning   | 1.625    | 0.027   | 59.912  | 0.000    | 1.625  | 2.036   |
| Learning opportunities   | 1.950    | 0.023   | 84.544  | 0.000    | 1.950  | 2.886   |
| Quality of the learning environment  | 2.113    | 0.025   | 84.214  | 0.000    | 2.113  | 2.871   |
| Safety and nursing care quality  | 2.180    | 0.020   | 107.004 | 0.000    | 2.180  | 3.663   |

(continued on next page)

Table 4 (continued)

|  | Estimate | Std.Err | z-value | P(>  z ) | Std.lv | Std.all |
|--|----------|---------|---------|----------|--------|---------|
| Degree of competence learned in the last clinical experience | 1.484    | 0.018   | 82.017  | 0.000    | 1.484  | 2.041   |
| Variances  |          |         |         |          |        |         |
| Being involved in handovers                                  | 0.618    | 0.009   | 65.845  | 0.000    | 0.618  | 0.809   |
| Quality of the tutorial strategies                           | 0.499    | 0.008   | 65.844  | 0.000    | 0.499  | 0.918   |
| Self-directed learning                                       | 0.597    | 0.009   | 65.845  | 0.000    | 0.597  | 0.938   |
| Learning opportunities                                       | 0.432    | 0.007   | 65.844  | 0.000    | 0.432  | 0.946   |
| Safety and nursing care quality                              | 0.337    | 0.005   | 65.845  | 0.000    | 0.337  | 0.951   |
| Quality of the learning environment                          | 0.511    | 0.008   | 65.845  | 0.000    | 0.511  | 0.943   |
| Degree competence learned in the last clinical experience    | 0.468    | 0.007   | 65.845  | 0.000    | 0.468  | 0.885   |
| R-square   |          |         |         |          |        |         |
| Being involved in handovers                                  | 0.191    |         |         |          |        |         |
| Quality of the tutorial strategies                           | 0.082    |         |         |          |        |         |
| Self-directed learning                                       | 0.062    |         |         |          |        |         |
| Learning opportunities                                       | 0.054    |         |         |          |        |         |
| Safety and nursing care quality                              | 0.049    |         |         |          |        |         |
| Quality of the learning environment                          | 0.057    |         |         |          |        |         |
| Degree competence learned in the last clinical experience    | 0.115    |         |         |          |        |         |

CS, clinical supervisor.

<sup>a</sup> The more recent clinical experience was that under evaluation.

<sup>b</sup> On a 4-point Likert scale (0 = “not at all” to 3 = “always”).

<sup>c</sup> On a 4-point Likert scale (from 0 = “never” to 3 = “always”).

<sup>d</sup> On a 4-point Likert scale (from 0 = “none” to 3 = “very much”).

clinical supervisor. Moreover, while the duration of the clinical rotation increased the quality of the learning environment as perceived by students ( $\beta = 0.021$ ,  $p < 0.001$ ), having previous university experiences ( $\beta = -0.055$ ,  $p = 0.001$ ) and more clinical rotations ( $\beta = -0.007$ ,  $p = 0.005$ ) prevented a quality learning environment as perceived by students.

The degree of ‘learning opportunities’ as perceived by nursing students at the unit level, have being prevented among those who were supervised by the staff ( $\beta = -0.302$ ,  $p < 0.001$ ), or by the nurse teacher ( $\beta = -0.274$ ,  $p < 0.001$ ), or by a nurse on a daily basis ( $\beta = -0.203$ ,  $p = 0.006$ ), or by the head nurse ( $\beta = -0.129$ ,  $p = 0.018$ ), as compared to those supervised by a clinical supervisor; in contrast, the ‘learning opportunities’ was slightly increased by the duration of the clinical rotation ( $\beta = 0.019$ ,  $p < 0.001$ ) and by the number of previous clinical experiences ( $\beta = 0.014$ ,  $p < 0.001$ ). Similar patterns emerged for the ‘safety and care quality’, ‘self-directed learning’, and ‘quality of tutorial strategies’ factors of the CLEQI tool, as reported in Table 4 and Fig. 1.

At the overall level, the model explained 19.1% of the variance of nursing students' involvement in handovers. Moreover, handover involvement as reported by students explained 11.5% of self-reported degree of competences learned during the clinical experience.

#### 4. Discussion

Handovers have been documented as a learning opportunity supporting both clinical competences and professional socialization (Skaalvik et al., 2010; Clouder, 2003; Rose, 2013), preparing students for their future workplace (Malone et al., 2016; Manias et al., 2016; Manias et al., 2015). However, at the Italian national level, about one out of four nursing students has experienced no or poor involvement in handovers during their last clinical rotation, thus potentially affecting the development of a patient-centred safety culture. Those students reporting limited handover opportunities may have been engaged in direct patient care during the shift-to-shift handover involving all staff (e.g., answering bell calls), thus denoting a poor recognition of the educational relevance of handover in understanding the clinical trajectory of patients. By having limited handover exposure, students are limited in understanding the clinical complexity of the patients' care; specifically, when this exclusion occurs at the end of the shift, students' contribution to patient care is undervalued; on the other side, when this

occurs at the beginning of the shift, students are thought to not base their decisions and practices upon the clinical history of patients and the previous nursing care delivered. Moreover, preventing student handover involvement can negatively affect their sense of engagement with the team and their socialization with different professional identities (Newton et al., 2009), as well as their reflective practice (Schön, 1983).

Handover involvement has reported poor cluster effects, both at the unit and nursing programme level where a greater influence has emerged. This seems to suggest that there is poor conformity across students attending the same unit in being involved or not in handover. Thus, this reflects an individual decision (e.g., by the clinical supervisor supervising the students) and not a ward culture; the higher degree of ICCs at the nursing programme level (0.22, which also remains poor) can reflect school surveys where cluster sizes are also likely to be large (Chromy, 2014) or may be explained by the relevance that different BNS programmes ascribe to handover.

Most of the factors affecting handover involvement were explained by the model of around 19% relied at the unit level: students who perceived greater quality of the learning environment and greater learning opportunities reported higher handover involvement. Our findings confirmed a previous thematic analysis identifying an invitational learning environment as vital for developing students' competence in handover, suggesting the relevance of both the learning qualities of the workplace and the clinical staff to develop nursing students' handover skills (Newton et al., 2009). Similarly, we found the pivotal role of the supervision model adopted by the unit—in promoting involvement in handovers by clinical supervisor supervision—as having the greater impact at the end point level directly and also indirectly, by affecting the quality of the learning environment and thus increasing handover involvement. Specifically, the supervision model based upon the staff—a nurse identified on a daily basis, or the head or the teacher nurse—indirectly reduced the quality of the learning environment as a whole, thus ‘limiting’ or ‘preventing’ handover involvement.

When a clinical nurse is in charge of the supervision, by taking on the clinical teaching role together with having responsibility for the patient, she/he undertakes strategies allowing the student to experience different learning experiences, recognized as essential for the nursing profession, such as handovers (Newton et al., 2009; Lee et al., 2016). Moreover, clinical supervisors have been documented as being more open to allowing students to “jump in and do it” (Newton et al., 2009)

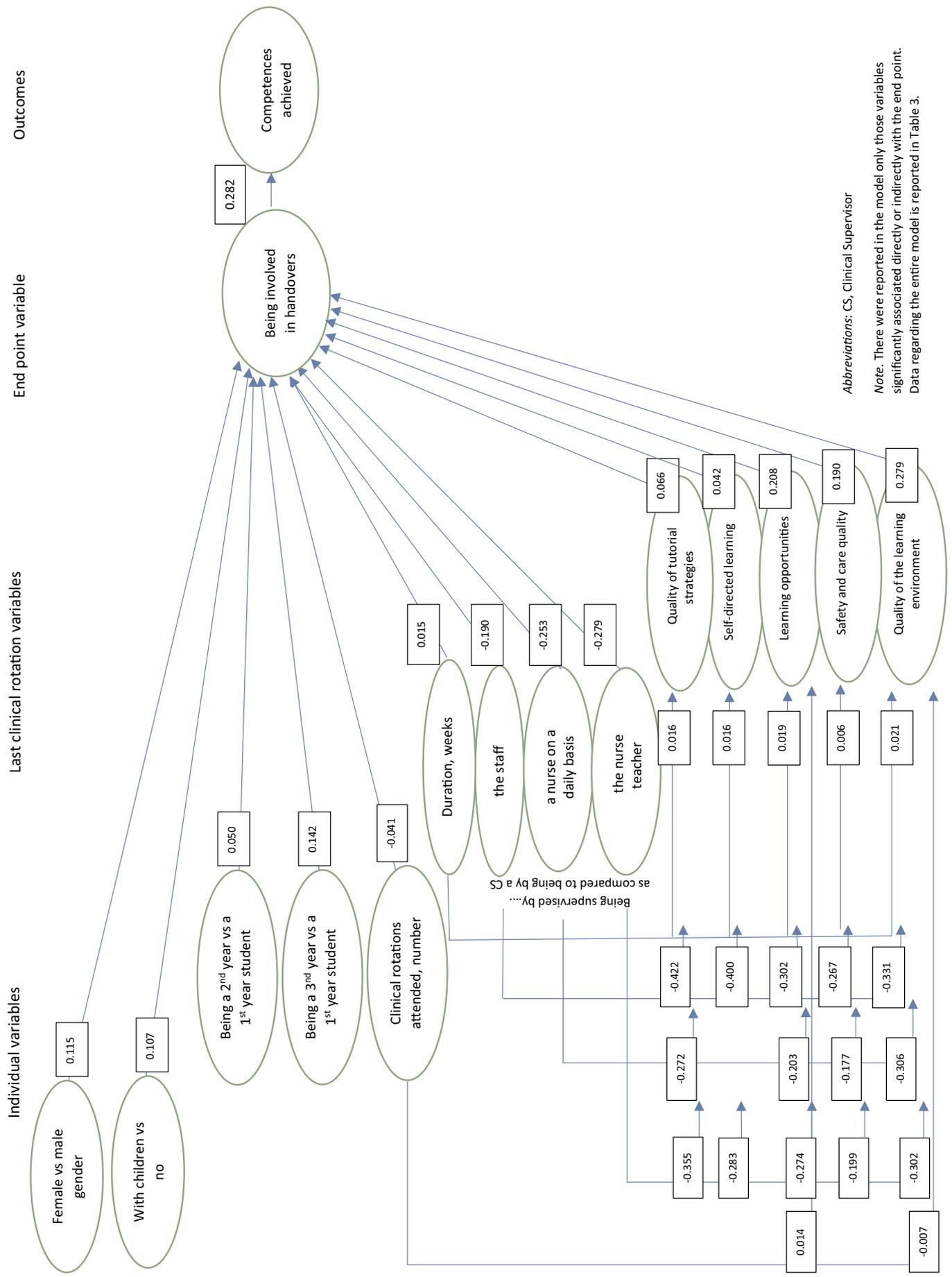


Fig. 1. Path analysis findings.

by directly engaging them in activities (e.g., handover) and in the meantime creating an environment that, in turn, is likely to generate rich learning. Furthermore, students who feel guidance and support from clinical nurses have been reported as having increased confidence in giving excellent handover (Lee et al., 2016). Good role models are likely to promote a positive student learning experience and emulation in future practice (Eaton et al., 2007; Lee et al., 2016); therefore, students should be exposed to as many handovers as possible and practise by giving handovers in order to improve their confidence in performing the task. Accordingly, the supervision model of the unit is central in directly increasing the involvement of students in handover by also influencing the quality of the learning environment lived by students. Thus, in deciding what supervision model to develop, faculties should train clinical nurses to improve their mentoring competences capable of actively involving the students; faculties should also preliminarily assess the quality of the learning environment, avoiding the assignment of students to those settings where they are engaged in direct care rather than offering them the opportunity to experience handovers.

A few variables emerged at the individual level: female students were more likely to be involved in handovers compared to their male peers, similarly to previous findings in the field (Palese et al., 2018a, 2018b, 2018c). Male students seem to be less exposed to handovers, thus limiting their opportunity to acquire these communication skills; this indicates an emerging pattern of gender discrimination. In addition, students with parental responsibilities perceived more opportunities of handovers. On the one hand, the continuity of care over transitions in their daily life can have increased their appreciation of handovers; on the other hand, due to family responsibilities, they can be more confident in collecting data aimed at prioritizing needs.

Being involved in handovers directly affected the degree of competences as perceived by students, explaining a variance of around 11%. Students are exposed to a variety of learning experiences during their clinical rotations, and no previous studies to our knowledge have linked specific learning opportunities with the competences achieved by students. However, in affecting the 11% of clinical competence achieved at the end of a clinical rotation, the participation in clinical handovers suggests their relevance in the process of becoming a nurse.

#### 4.1. Limitations

At the end-point level, we investigated students' overall involvement in handovers, without differentiating between an 'active' involvement, where students are directly involved in giving or receiving shift-to-shift handovers, and a 'passive' exposure, where students do not contribute to the team discussion and wait for the end of the narrative handover in a corner of the handover room (Newton et al., 2009). We collected the end point and the explanatory variables at the same time, according to the cross-sectional nature of the study; therefore, the phenomena called 'reverse causal effects' (Katz, 2006) should be considered, e.g., the nursing students' involvement in handovers increased the perception of learning opportunities, and not vice versa.

We used different data collection methods, according to the resources available in the nursing programme, and this could have affected the amount of missed data as well as introduced a selection bias (e.g., different missed data and attrition rates between students filling in the questionnaire online or in hard copy).

#### 5. Conclusions

One out of four nursing students reported no involvement or poor involvement in handover during their clinical rotations, thus potentially affecting the development of the communication skills that are an essential requisite to practice as future registered nurses. The limited opportunities for handover involvement can also prevent students' sense of becoming part of the team, their professional socialization, and their identity development.

Factors affecting the perception of handover involvement mainly emerged at the unit levels where students attended their clinical experience. The pedagogical atmosphere characterised by the quality of the learning environment, the learning opportunities offered, and the model of supervision adopted strongly influenced handover involvement. When students were supervised by a clinical nurse, they were more likely to be involved in handovers in an invitational learning environment that in turn promoted handover involvement; thus, the clinical nurse acted both directly and indirectly by positively influencing the learning environment.

Nursing faculties should assess the supervision model and the quality of the learning environment before deciding about the accreditation of the unit for nursing student clinical rotations. Units should offer students learning opportunities not limited to direct patient care in order to allow the development of a wide range of competences, since being involved in handovers affects the perceived degree of competences learned during the clinical rotation. Moreover, learning environments should be periodically assessed to determine their ability to engage students in handovers. Furthermore, clinical nurses who supervise students should be trained to enhance their competence in promoting students' involvement in handover and should particularly encourage male students to test themselves with handovers.

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#### Author Contributions

| Criteria  | Author initials   |
|---|---|
| Made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data;  | AP, AD, IM, VDM, PA, AB, AB, ADP, LDB, AF, SG, FM, OM, RN, GR, MT, FC, LS, LZ, ST, SG     |
| Made substantial contributions in analysis and interpretation of data;  | AP, LG, SG  |
| Involved in drafting the manuscript or revising it critically for important intellectual content;   | AP, LG, ST, SG  |
| Given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content; | AP, LG, AD, IM, VDM, PA, AB, AB, ADP, LDB, AF, SG, FM, OM, RN, GR, MT, FC, LS, LZ, ST, SG |
| Agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. | AP, LG, AD, IM, VDM, PA, AB, AB, ADP, LDB, AF, SG, FM, OM, RN, GR, MT, FC, LS, LZ, ST, SG |

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#### Conflict of Interest

No conflict of interest has been declared by the authors.

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