

Exploring Effects of Interprofessional Education on Undergraduate Students' Behaviour: A Randomized Controlled Trial

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Abstract

Background: One way to improve the quality of palliative care for elderly patients is to use an interprofessional team approach, which may be encouraged through interprofessional education (IPE). However, the effectiveness of IPE interventions has yet to be proven. We therefore designed a randomized controlled trial using a simulated practice setting to measure the effects of an IPE intervention on medical students' clinical behaviour.

Methods: Undergraduate nursing ($N = 20$) and medical ($N = 20$) students were evenly assigned to either an intervention or a control group. Students in the intervention group received interprofessional curriculum (12 teaching units), and the control group was given written material containing the content of the IPE curriculum. Using a pre-post design, clinical behaviour of matched pairs of nursing and medical students was analyzed for qualitative (care objectives) and quantitative aspects of communication (initiation, interruptions, speaking time, and exchanged information items). Statistical analyses included chi-square, Fisher's exact, and t -tests, where appropriate.

Results: Care objective scores improved in both groups (categories $N = 6$, p -range = intervention group: .001-.630; control group: .001-.888). Interruptions and speaking time showed no change between or within groups, while the number of nursing student-initiated contacts increased ($p = .0007$). The number of information items exchanged increased significantly in both the intervention group (Pre: $M = 9.65$, $SD = 1.79$; Post: $M = 12.35$, $SD = 1.87$; $p = .001$) and the control group (Pre: $M = 8.75$, $SD = 2.59$; Post: $M = 11.75$, $SD = 2.22$; $p = .001$).

Conclusions: We found a moderate effect of IPE on a change in interprofessional communication style.

Keywords: Interprofessional education; Nursing; Behaviour; RCT; Palliative care; Elderly

Introduction

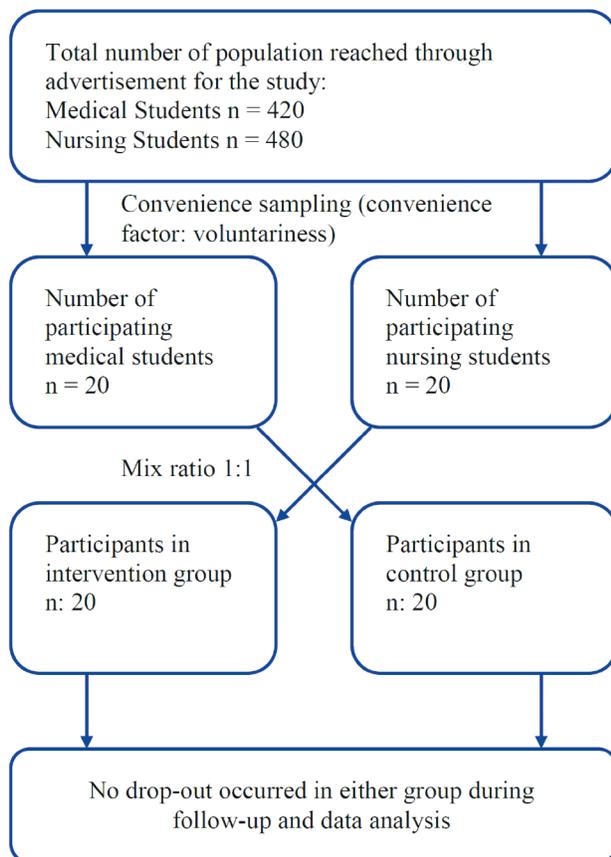
Delivering high quality palliative care to elderly patients is complicated by several factors, including multimorbidity, dementia, frailty, and other forms of functional impairment [1-3]. The challenge of improving the quality of palliative care is further escalated by demographic changes in many countries where the proportion of people aged 60 years and older grows significantly [4-6]. In addition, insufficient treatment of pain among the elderly is a problem that is just recently being tackled [7,8].

Among other approaches like holistic care or better care coordination, the interprofessional team approach is considered particularly helpful when facing this challenge [6,9,10]. Indeed, recent data shows that conflicts between professions can be a hindrance to adequate delivery of care [11].

The increasing need for interprofessional education (IPE) has been acknowledged on a national level, for instance, by the German government [12], as well as on an international level by the WHO [13]. Providers of education are urged to implement curricula that serve to prepare healthcare professionals for interprofessional teamwork by developing the skills needed. *Interprofessional Education occurs when two or more professions learn with, from, and about each other to improve collaboration and the quality of care* [14]. What remains unclear is whether IPE really influences students' behaviour in the everyday clinical setting. Past studies suggest it does; however, the methodology used in these studies is considered weak, as approaches to measuring behavioural changes relied on self-reported perceptions of change [15].

In a systematic literature review (SLR) of interprofessional education and its evaluation, Hammick et al. [15] suggest that evaluation of IPE in real and simulated practice settings is needed to strengthen our knowledge of mechanisms that lead to positive behaviour changes. This study aimed to examine whether IPE effects on behaviour can be shown using a simulation technique. The study objectives were 1) to assess qualitative performance (care objectives) and 2) to analyze quantitative performance changes in initiation of contact, interruptions, speaking time, and information items exchanged.

Figure 1
Participant flow



Methods

This was a stratified, single-blind, controlled, parallel group study conducted in one German medical school.

Participants

Eligible participants (see Figure 1) were third-year undergraduate medical and nursing students from the Rhein-Ruhrgebiet region in Germany. This population is representative of Germany's medical and nursing students, as medical and nursing education is nationally standardized. However, students volunteered for this study, thereby constituting a convenience sample. Bias related to this method will be discussed later.

A sample size of $N = 40$ consecutive students were enrolled in the study, the number repre-

senting a compromise between the calculated sample size (see “sample size”), teaching quality considerations, and available resources.

Intervention

The intervention group received a teaching intervention that was designed to deliver interprofessional core competencies. To teach those competencies, we designed a curriculum around palliative care for elderly people. Education was delivered in an interprofessional way as defined by CAIPE [14]. Seminar topics are presented in Figure 2.

Figure 2
Seminar topics and delivery schedule

Day 1 (6 teaching hours)		Day 2 (6 teaching hours)	
Palliative Care: (3 teaching units) - Holistic Care - Pain Management - Burden of Old Age 1	Geriatrics: (3 teaching units) - Multimorbidity - Geriatric Assessment - Burden of Old Age 2	Communication: (3 teaching units) - Advance Direct. -Interprof. Team Approach - Breaking Bad News	Organization: (3 teaching units) - Need for care -Social Networks -Plan of Care

A detailed description of the curriculum is given elsewhere [16]. The educational strategies used include PowerPoint presentations, case studies, reference articles, role play, reflection, and discussion rounds, as the potential of IPE to change behaviour is considered to improve by blending different educational methods [17].

The control group did not receive any teacher-based intervention. Participants were merely provided with the written materials (text, slides, and paper-cases), which were used by the facilitators in the intervention group. Control group participants were asked to study these materials in silence. Silence and the prevention of interaction were regulated by a supervisor, thereby controlling for the independent variable (IPE). This design was adopted to identify specific effects that are caused by IPE instead of being caused by baseline knowledge acquisition through information input.

A teacher-student ratio between 1:5 and 1:10 is suggested for successful IPE, as discussed by Oandasan and Reeves [18]. Three experts facilitated the implementation of the curriculum. For a facilitator to teach the curriculum, we defined the following minimum requirements: clinical experience in their respective field of specialization (palliative care, geriatrics, communication science) greater than 5 years, sufficient demonstration of academic qualification (MSc/PhD in Palliative Care, MScN, DPsych), and demonstration of training in didactic methodology (train the trainer certificate).

For additional guidance, tutors were asked to refer to the seven Interprofessional Core Competencies (CC 1-7, shown in Figure 3) identified by the Canadian Interprofessional Health Collaborative [19].

Figure 3
Seven interprofessional core competencies

- (1) Respect (2) Communication (3) Patient-Centred Practice
(4) Decision Making (5) Shared Knowledge and Skills
(6) Problem Solving (7) Work collaboratively or as a team.

Pre-intervention, all three facilitators attended a two-hour individual training session. This involved an introduction to, as well as a discussion of, the CC and the seminar topics. As the facilitators were asked to exemplify to the students all core competencies using examples from curriculum topics, such examples were given and discussed using a standardized table.

Example: Dementia is a common issue in the elderly. Evaluating pain in a patient with dementia can be very challenging. When specific behaviour indicating pain has been identified by nursing staff, CC5 becomes important as this piece of information has to be communicated to the medical staff in order to jointly take measures to relieve the patients suffering (also CC1 and 2 may be simultaneously used; see Figure 3).

Figure 4
Hypotheses

Hypothesis	“expected” behaviour occurred if participants:	CC’s involved
I	...share more uni-professional information.	2, 5, 7
II	...communicate more sensitively and respectfully.	1, 3
III	...formulate higher quality care objectives.	4, 6, 7

Objectives

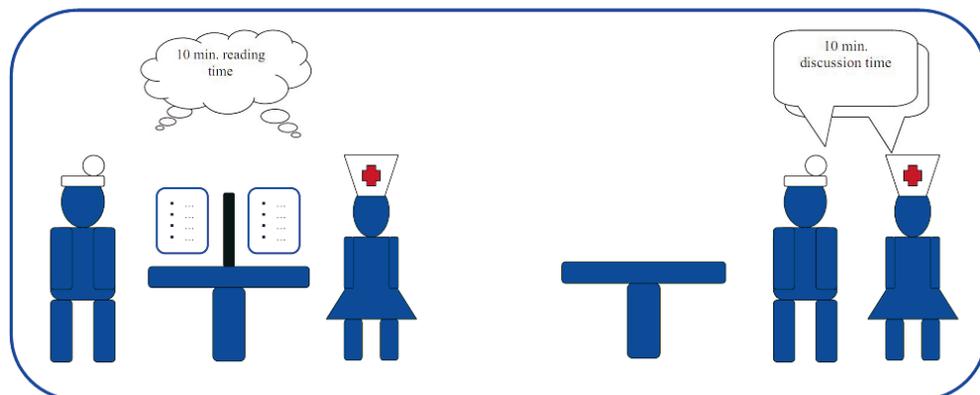
This study aims to examine whether IPE effects on behaviour can be shown using a simulation technique. In order to formulate concrete hypotheses on positive inter-professional behaviour, we referred to the definition of interprofessional working capabilities (IWC) by Walsh [20] (Figure 4).

According to CAIPE's definition of IPE [14], hypotheses I and II can be seen as assessing the factor of collaboration as a positive outcome of IPE. Meanwhile, hypothesis III partly addresses the factor of quality of care, although actual quality of care is a multifaceted concept linked to the patient and the clinical setting that could not be fully measured in the context of this study.

In terms of measurement, we established a simulated practice setting to control for external confounding. Two different case vignettes were presented to matched pairs (medical:nursing = 1:1) pre- and post-intervention. Vignettes had to be read individually in silence, and making notes was encouraged. Case vignettes described the medical history and current state of a hospitalized elderly person close to the end of life. Vignettes were modified for both professional groups and contained, in addition to general baseline information, 15 extra profession-specific information items that were not included for the other professional group, and vice versa. We then asked each pair of professionals to jointly discuss the case and decide on care objectives while they were being filmed, as shown in Figure 5 and 6.

We call this method "simulated interprofessional contact" (SIC).

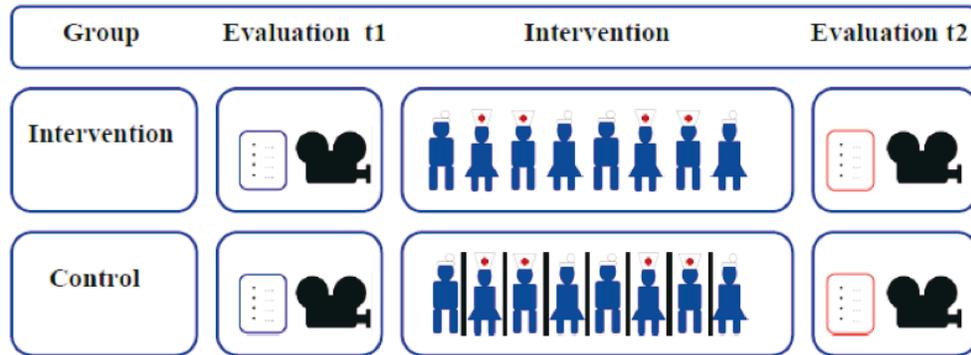
Figure 5
Evaluation method



Case vignettes were generated through a Delphi process, including five experts from palliative care, geriatrics, and nursing science. In a second step, vignettes were pre-tested for accessibility, distribution of information items, and content validity. Results of the pre-test indicated that changes to the case vignettes were not necessary (data not shown, available upon request).

We developed a common grid suitable for transcribing the video material, which was then independently screened and evaluated by two data analysts (HH, JM). Results were compared, and in conflicting cases (which were predefined) videos were jointly re-evaluated and conflicts resolved through communicative validation.

Figure 6
Study design



Listed below are the criteria used to quantify and measure the hypotheses that were extracted from SIC for both groups, pre- and post-intervention:

Hypothesis I (primary endpoint): The number of shared uni-professional information items during the interaction were compared.

Hypothesis II: Three parameters commonly used in gender communication studies were used to quantify sensitive and respectful communication [21,22]:

- Who initiates the interaction?
- Do partners interrupt each other/how often does this happen?

We defined an interruption as impairing the semantic well-formedness of the partners' word flow. For example,

Person A: "On Mr. Miller - we should really consider changing..."

Person B (interrupting): "Ah, yeah, you're right - I will have a look at his file later."

- How much speaking time do partners occupy in relation to each other?

Hypothesis III: the care objectives agreed upon by each team were presented to four independent experts (from the fields of geriatrics, palliative care, nursing, and social work), who allocated them to six different categories and judged their reasonableness on a 6-point Likert Scale (1= very unreasonable, 6=very reasonable). The categories used were: pain therapy, therapy of other symptoms, guarding of patient's autonomy, advance planning, integration of relatives, and integration of psychological aspects.

Outcomes

An increase in the number of uni-professional information items exchanged (meaning information that is only accessible to one profession) in these encounters served as the primary endpoint to this study. Additionally, communication style and quality of care objectives were analyzed.

Ethics

Participants (both control and intervention groups) were not considered vulnerable subjects as they had the capability to agree to an informed consent [23]. The subjects were informed about the project, received promise of data protection and confidentiality, and were given the opportunity to ask questions. All participants provided written informed consent.

Sample Size

Sample size was determined using calculation software [24]. The number of exchanged information items was the primary endpoint (15 items = 0-15 points, $\alpha = .05$, Power = .80, $\delta = 3$ P, Scattering = 3 P) and showed the need for 17 participants per group. Calculations performed for other hypotheses showed that $N = 17$ was also sufficient for secondary endpoints. To prevent problems related to drop-out, 20 participants were included in each group.

Randomization

Medical and nursing students were randomly assigned to the intervention and control group using a simple, computer-based random numbers procedure. Randomization was done separately for both professional groups (i.e., stratified) to ensure a ratio of medical and nursing students of 10:10 in both study groups.

Allocation concealment

Allocation to the groups was performed using numbered papers and a ballot box. The sequence was concealed until interventions were assigned.

Implementation

Planning and execution of randomization was performed by a staff member who was involved neither in teaching nor in the evaluation of the video material.

Blinding

Whereas participants allocated to the groups were aware of the allocated arm, outcome assessors and data analysts (JM, HH) were blinded to the allocation. Videos were presented to them in a mixed order using ciphering generated by the staff member responsible for randomization of the participants.

Statistical Methods

Data analysis was performed using the statistics software SPSS. Special tests for nominal data included chi-square, where applicable, or Fisher's exact test (information items, interaction initiation, interruptions). Mean values were compared by use of the *t*-test for independent samples (quality of care objectives).

Results

Participant flow

Participant flow was smooth. All 40 subjects showed up one hour before the first

evaluation (t_1) as planned and were randomly and evenly assigned to the two study groups.

Implementation of intervention

The curriculum and the control group were implemented as planned. No adverse events occurred.

Recruitment

As the follow-up evaluation (t_2) was performed immediately after completion of the intervention, and all study participants agreed to further participate in the study, no subjects were lost to the analysis.

Table 1
Demographics, death experiences, and attitudes of participants

Characteristics	Total	Intervention group	Control group	Medical students	Nursing students
<i>N</i>	40	20	20	20	20
Average age (min, max)	24.6 (20, 45)	25.5 (22,45)	23.7 (20, 35)	23.7 (20, 28)	25.5 (21, 45)
Female (%)	83.3	81.0	85.7	85.0	81.8
Family status (%)					
Single	97.6	100	95.2	100	95.5
Married	0.0	0.0	0.0	0.0	0.0
Widowed	2.4	0.0	4.8	0.0	4.5
Average number of "loss through death" events					
Core family	1.0	1.3	0.7	0.5	1.4
Relatives	2.6	3.3	1.8	3.0	1.7
Friends	1.3	1.4	1.1	1.4	1.0
Patients	7.0	8.0	6.1	3.9	10.3
Average age at 1st death experience, (min, max)	10.1 (3, 20)	9.6 (3, 19)	10.7 (3, 20)	9.9 (3, 20)	10.3 (3, 20)
Perceived communication quality in hospitals (on scale of 1-6; 1 = very good, 6 = very bad)					
Teamwork in general	3.7	3.5	3.8	3.7	3.5
Effort made by doctors	3.8	3.9	3.4	3.8	4.0
Effort made by nurses	3.5	3.4	3.5	3.6	3.4

Baseline Data

Both intervention and control groups were relatively homogeneous in terms of demographics, including age, sex, and family status. Also, the number of death experiences and judgement on communication quality within hospitals were relatively

similar for both groups. These factors might help to control for possible confounders, despite the effort of randomization, within such a small sample [25]. Therefore, bias caused by strong differences between the groups can be regarded as unlikely.

Numbers analyzed

There was no (0/40 = 0%) dropout; all participants in both groups underwent evaluation before and after the intervention/comparator, and all data were eligible for inclusion. All participants (N = 40) were included in the analysis.

Outcomes and Estimation

Care objectives

Care objective scores increased post-intervention for both groups in all but one category: care of other symptoms. The increase in score for the control group was statistically significant for two categories: guarding of patient's autonomy and integration of psychological aspects. Scores for the intervention group were significant for three categories: pain therapy, guarding of patient's autonomy, and integration of psychological aspects. Table 2 depicts changes in care objective scores before and after the intervention, as compared between the intervention and the control groups. P-values and a 95% confidence interval are given for the t-test.

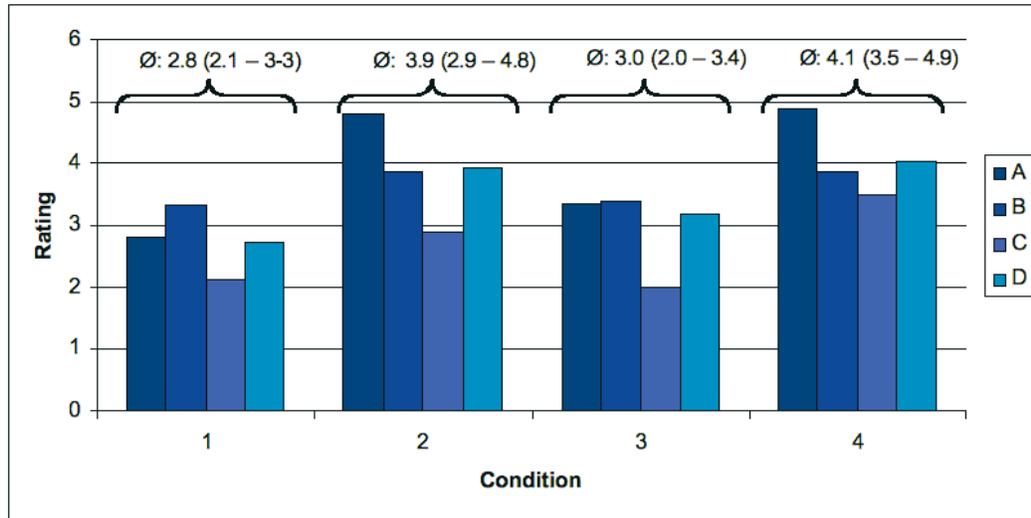
Table 2
Care objective scores

Category	Groups (N = 20)	Pre M ± SD	Post M ± SD	t	df	p-value	MD	95% CI
Pain management	Intervention	2.88 ± 1.63	4.90 ± 1.23	-3.14	18	.006*	2.03	0.67, 3.38
	Control	3.28 ± 2.00	4.70 ± 1.26	-1.91	18	.076	1.43	-0.17, 3.02
Other symptoms	Intervention	3.78 ± 0.43	3.63 ± 0.68	0.49	18	.630	0.15	-0.81, 0.51
	Control	3.63 ± 0.94	3.63 ± 0.57	-0.14	18	.888	0.05	-0.69, 0.79
Patient's autonomy	Intervention	1.98 ± 0.56	3.98 ± 0.95	-5.76	18	.001**	2.00	1.26, 2.74
	Control	1.80 ± 0.26	4.30 ± 0.91	-8.39	18	.001**	2.50	1.84, 3.16
Advance planning	Intervention	3.50 ± 0.42	4.15 ± 0.92	-2.03	18	.065	0.65	-0.05, 1.35
	Control	3.00 ± 0.67	1.80 ± 0.91	-0.49	18	.629	0.18	-0.58, 0.93
Integration of relatives	Intervention	3.55 ± 0.98	4.15 ± 0.88	-1.44	18	.167	0.60	-0.26, 1.48
	Control	3.05 ± 0.87	3.85 ± 1.00	-1.91	18	.073	0.80	-0.84, 1.68
Psychological factors	Intervention	2.20 ± 0.76	3.65 ± 1.06	-3.51	18	.003*	1.45	0.58, 2.32
	Control	1.75 ± 0.17	3.58 ± 0.62	-8.93	18	.001**	1.83	1.37, 2.28

Note: M=mean; SD=standard deviation, MD=mean difference, CI=confidence interval *significant **highly significant

Figure 7 shows the pre- and post-mean care objective scores of each study group for all six categories combined, as rated by each expert individually. Mean rater value and rater range are displayed above the brackets.

Figure 7
Inter-rater range



Condition: 1=Control pre; 2=Control post; 3=Intervention pre; 4=Intervention post
Experts: A=Geriatrics; B=Palliative care; C=Nursing; D=Social work

Sensitive and respectful communication

Three different communication parameters were studied:

Who initiates the interaction? A statistically significant change was present in the intervention group, while no change was detectable in the control group. Table 3 depicts changes in communication initiation before and after the intervention as compared between the intervention and the control group. P-values are given for the Fisher's exact test for nonparametric testing in small samples.

Do partners interrupt each other/how often does this happen? No interruptions, according to our definition, occurred in any of the interactions.

How much speaking time do partners occupy in relation to each other? Occupation of speaking time did vary slightly in both groups before and after the intervention. Table 4 depicts changes in occupation of speaking time before and after the intervention as compared between the intervention and the control group.

Table 3
Initiation of contact

Group	Profession	Number of initiated contacts (N)		p-value
		Pre	post	
Intervention (N = 20)	Medical (N = 10)	8	0	.0007**
	Nursing (N = 10)	2	10	
Control (N = 20)	Medical (N = 10)	5	5	.6547
	Nursing (N = 10)	5	5	

*significant **highly significant

Table 4
Occupation of speaking time

Group	Profession	Total occupation of speaking time (% ± SD)	
		Pre	post
Intervention (N = 20)	Medical (N = 10)	50.52 ± 15.45	47.72 ± 6.29
	Nursing (N = 10)	48.95 ± 15.79	52.28 ± 6.29
Control (N = 20)	Medical (N = 10)	45.54 ± 7.17	44.02 ± 7.30
	Nursing (N = 10)	54.42 ± 7.15	55.90 ± 7.19

SD=standard deviation

Number of exchanged information items

There was a statistically significant increase in the number of information items exchanged for both the control and intervention groups. Table 5 depicts the number of uni-professional information items exchanged before and after the intervention as compared between the intervention and the control group. *P*-values are given based on chi-square tests for non-parametric samples.

Table 5
Number of information items exchanged

Group	Subgroup	Number of items exchanged (M ± SD)		<i>p</i> -value
		Pre	post	
Intervention (N = 20)	Medical (N = 10)	9.40 ± 2.01	11.80 ± 1.93	.004*
	Nursing (N = 10)	9.80 ± 2.14	12.70 ± 1.52	.0002**
	Total (N = 20)	9.60 ± 1.79	12.25 ± 1.87	<.0001**
Control (N = 20)	Medical (N = 10)	7.80 ± 2.44	10.90 ± 2.64	.0004**
	Nursing (N = 10)	9.70 ± 2.50	12.60 ± 1.35	.0002**
	Total (N = 20)	8.75 ± 2.59	11.75 ± 2.22	<.0001**

*significant **highly significant

Adverse events

No adverse events were reported.

Discussion

Interpretation

A statistically significant increase in the number of information items exchanged was observed for both the control and intervention groups. As discussed in detail later, we believe that the method of evaluation could have influenced the participants to realize the significance of information exchange. Neither the written material nor the seminar seem to have influenced this increase in exchanged

information items. Two different case vignettes were used pre- and post-intervention to control for recall bias. This leaves potential space for bias through differences in vignettes. However, case vignettes had been pre-tested for accessibility, distribution of items, and content validity, making them an unlikely source of bias. This leaves the initial evaluation interaction as the most likely cause for change.

While interaction initiative remained stable between both professions in the control group, all post-intervention interactions were initiated by nursing students in the intervention group. This observation might reflect an increased role understanding within both professional groups as well as an increase in self awareness of nursing students. It is likely that nursing students' initiative and/or medical students' openness to enter information exchange and joint planning increased through our IPE intervention.

Interestingly, no interruptions occurred and speaking time was shared evenly—anyone familiar with clinical work would consider this an unlikely result. However, these results might reflect bias as a result of convenience sampling and social desirability within the experimental setting, as discussed later in detail.

These results appear to suggest that IPE has a positive effect on collaboration between different professions.

The overall quality of care objectives increased in both groups, but the effect tended to be more significant in the intervention group. This observation could suggest that improvement in quality of care objectives is linked to information delivery through the seminar or written material. However, considering the conditions of the trial, we find it likely that this effect was partly caused by a “learning effect” impinged through the SIC. Thus, the interpretation of this finding remains controversial. We also noted rating differences between the experts, which seem to be due to inter-individual as well as profession-specific disparities.

Generalizability and limitations

An experimental randomized controlled trial is a useful design for evaluating the effects of IPE within complex interventions, as it focuses on efficacy rather than effectiveness [26]. In order to guarantee standard procedure for complex RCTs, we followed the phase plan for complex interventions suggested by Campbell (Phase III) [27]. Still, several limitations apply to the results presented—especially in relation to the method of evaluation—which will be specified below.

To our surprise, the number of exchanged information items increased significantly for both groups. One explanation for why this occurred may be that the SIC caused this effect in both groups. The SIC method used is similar to the concept of simulated patient contact applied in medical education [28], where videotaped patient-doctor contact is used as an educational tool. It is likely that this could be true for the SIC as well. Instead of solely being a point of measurement in time (like taking a blood sample), the SIC might have impinged a “training effect” on both groups. This training effect is a bias to our results, but at the same time it points to the possible value of the SIC when used for educating students. This interesting finding merits further investigation.

Participants volunteered for this study, which represents convenience sampling. This type of non-probability sampling has less external validity, as the sample group is not representative of the average medical or nursing student. Instead, the sample might represent a more dedicated subgroup of learners who have a more positive attitude toward IPE. As students with negative attitudes toward interprofessional learning tend to gain the least from IPE courses [29], the results of this study might overestimate the actual effect of our intervention.

Participants were not blinded to the fact that they received an IPE intervention. Therefore, a social desirability bias, especially in terms of impression management—a conscious self-presentation tailored to an external audience [30]—is possible. Furthermore, it is possible that the presence of a camera had additional influence on participants' behaviour. However, experience with simulated settings suggests that students quickly forget about the cameras' presence [31,32] and therefore act more habitually. It has to be kept in mind that the risk of observing selected, instead of habitual, behaviour is a general problem when using simulated settings [33]. Incognito evaluation [34] could be a solution to this problem, but it is expensive, logistically very demanding, and raises ethical concerns [33,34].

In our study, we mainly focused on the effects of IPE on verbal communication. It cannot be said if the short-term findings of this study would persist over time. Long-term follow-up in studies on communication skills in cancer care show variable results, but positive effects tend to be sustainable [35]. However, this question was not within the scope of this work. Nevertheless, it should be further investigated, as there is a paucity of longitudinal studies in IPE concerning behaviour [36]. Longitudinal testing, as well as the use of multiple methods of assessment, can overcome many of the limitations of individual assessment formats and study designs [37].

Finally, this study is representative of only one cultural background, in this case, German. Cross-cultural studies will be necessary to further support and advance the claims made by this paper.

Overall evidence

Teamwork skills are considered to be important in delivering patient care [38]. Learning with, from, and about each other in the health sciences can serve to positively influence frequency of communication, communication errors, and the working atmosphere [39]. What is more, it can serve to positively influence the quality of care [40].

However, these connections are not supported by clear empirical evidence [41]. Evidence only exists on the level of self-perceived behavioural and attitude change, as pointed out by Hammick [15]. Therefore, the need for further research to strengthen our knowledge of the effects of IPE seems necessary. This study was aimed at showing effects of IPE on the level of behaviour, beyond the scope of self-perceived effects, using an experimental RCT set-up. However, as Campbell already described thoroughly, such a “complicated intervention,” dealing with complex inter- and intrapersonal influences and change, is subject to many confounding factors [27], which we have discussed. Nevertheless, we were able to produce a first

layer of empirical evidence in support of IPE effects on the behaviour of nursing and medical students. Although, it must be added that the SIC technology will have to undergo further development before it can be tested in a Campbell Phase IV trial, that is, before it can regularly be used in a practical setting.

Conclusions

We established an experimental RCT to evaluate the effects of an interprofessional education intervention on nursing and medical students. We found a moderate effect toward a change in interprofessional communication style. However, we encountered relevant difficulties in establishing the simulated setting and following the planned study design. Those methodological aspects are critically discussed in this paper.

We introduced a new video simulation technique—simulated interprofessional contact (SIC)—for clinical evaluation and assessment. This new method proved promising, but clearly needs further evaluation as an educational tool in IPE.

Despite all obstacles, generating empirical data on IPE effects is possible, and researchers should strive to further increase the body of evidence.

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Abbreviations

IPE: Interprofessional education

SLR: Systematic literature review

CC: Core competencies

RCT: Randomized controlled trial

IWC: Interprofessional working competence

SPC: Simulated patient contact

SIC: Simulated interprofessional contact

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Case Vignette A

General information

You are the nurse/attending physician on a medical ward in a large hospital. Mister W., an 85-year-old patient, has recently been admitted to your ward by his family doctor, suffering from confusion. It is also known that he suffers from intestinal cancer and coronary disease. You have already gathered further information during your contact with the patient, which you want to share with the nurse/attending physician of your ward.

Information for medical students

Upon admission, Mr. W. appears confused. He is orientated as far as his person is concerned but not regarding place or time. The last Mini-Mental State examination was performed one month ago with a score of 23 points; at present, a repeat test would not seem useful. Despite his confused state, he seems agitated and uncomfortable. Lab results are negative for any sign of heart attack. Abdominal auscultation reveals reduced peristaltic activity above all quadrants. During palpation, you find a 10 x 4cm resistance in the left lower quadrant which seems to be a filled sigma. The rectal exam is painful for the patient, and you can feel a hard faeces structure. His lips and tongue are dry. Sonography reveals a collapsed vena cava as a sign of intravasal hypovolemia but no trace of metastases that could be responsible for the present situation. A chest x-ray shows no pathological findings related to the current symptoms.

The patient repeatedly mentions his son, who seems to live in a distant part of the country.

Information for nursing students

Mr. W. seems anxious. He is squirming in his bed and grimaces (contraction of eyebrows, wrinkling of the nose, repeated closing of eyes). The clothes he brought from his home are dirty, also his dentures appear unattended. Furthermore, you find haematomas of different ages on his legs and posterior. Discrete pitting oedema can be found at his ankles and he is not able to sit on the edge of the bed.

His wife and son are waiting outside the room.

When you talk to them later, the wife seems friendly but confused. Her hair is greasy and despite rather summery temperatures she is wearing a coat. She tells you that her husband has been like that since last night. She fears that he "now finally suffers from Alzheimer's disease," although until now he has been "a bit forgetful but not really much." Furthermore, she reports that her husband had recently developed problems with defecation. Mrs. W. starts to cry: "If my daughter had been here, all of this wouldn't have happened." The son tells you that his sister usually takes care of their parents, but she is currently on holiday.

Case Vignette B

General information

You are the nurse/attending physician on a palliative care ward in a large hospital. Miss M., an 86-year-old patient, has been transferred to your department from a general medical ward late in the evening. She is first seen by the attending physician who is on call. One day later the attending physician and Miss W.'s nurse meet up to discuss her case and share their observations.

Information for medical students

Miss W. is breathing heavily when you enter the room. Her reactions are slow. The transferring colleague had told you: "This woman is in a terminal state, we can't do anything about it." She has been diagnosed with pancreatic cancer, but the stage is unclear as the patient refuses further diagnosis. Different chemotherapeutic regimens have been applied but without success. Curative surgery is not an option. Palliative radiation has been performed with a positive effect on quality of life. The current medication involves an opioid for mild pain and an antiemetic. During the time you have been inside the room, the patient seems to have become increasingly uneasy and breathes more heavily (Dyspnoea Numeric Rating Scale: 5). You therefore administer 5mg of morphine subcutaneously with a good result (Dyspnoea Numeric Rating Scale: 2).

The patient is being nourished through a percutaneous jejunal feeding tube. The access area is red and seems inflamed. You consider changing the tube during her stay on your ward. You remember your colleague's statement about the woman being terminal, which you now find doubtful. You hope to be able to further increase your patient's quality of life within the next few days.

Information for nursing students

You encounter an unexpectedly lively and assertive patient, who complains of pain and slight nausea. However, she is still able to sit on the edge of the bed. During this process, you become aware of a seemingly old morphine patch on her back. She starts to complain about the doctor on the ward she has been transferred from. She claims that he did not listen to her carefully and ignored her wishes. Then she abruptly becomes quiet and tells you about her fear of "the end." "No one told me anything about the course of disease, I mean, I know I'm going to die, but how and what will I have to suffer...?"

Despite asking for information on the expected course of suffering, the patient also claims that she never agreed to tube feeding and asks you to immediately take the "horrible tube" out of her. (The patient is nourished through a percutaneous jejunal feeding tube.) Meanwhile, the daughter has entered the room. She has listened to the last part of your conversation and is sobbing. She hugs her mother, telling her that she would starve to death without the tube and that she can't let that happen. After the daughter has calmed down, she tells you that she and her brother are at odds concerning the further treatment of their mother.