

# Interprofessional Clinical Simulation-Based Education to Develop Professional Identity and Professionalism in Japanese Medical and Nursing Students

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## Abstract

**Introduction:** We conducted a multi-occupational team simulation training for medical and nursing students and clarified how professional identity and professionalism attitudes change with interprofessional education (IPE). **Methods:** Thirty-nine 4<sup>th</sup>-year medical students and 48 2<sup>nd</sup>-year nursing students were enrolled and distributed to the educational intervention group and the control group. We used a vocation identity scale including lower four subscales, a scale for professionalism including lower five subscales, a readiness for inter-professional learning scale (RIPLS), and an interdisciplinary education perception scale (IEPS). **Results:** Among the medical students, IPE using an advanced patient simulator improved the scores on the vocational identity scale, scale for professionalism, RIPLS, and IEPS. Among the nursing students, IPE improved the scores on the vocational identity scale, scale for professionalism, RIPLS, and IEPS. **Conclusion:** On-the-job training using simulated clinical training by a multi-occupational team improved vocational identification and professionalism.

## Keywords

Interprofessional Education, Advanced Patient Stimulator, Vocational Identity, Professionalism

## 1. Introduction

Japanese medical and nursing students enter medical and nursing schools, respectively, after graduating from high school. First-year students have insufficient experience regarding professional identity and professionalism. Wakayama Medical University adopts a series of interprofessional education programs from the 1<sup>st</sup> to the 6<sup>th</sup> year of medical education and the 1<sup>st</sup> to the 4<sup>th</sup> year of nursing training. Moreover, we promote the buildup of occupational identity in several steps of the educational programs. As both the 4<sup>th</sup> grade of medical students and the 2<sup>nd</sup> grade of nursing students are in the grade immediately before the clinical training period in Japan, we newly adopted an elective joint class of 4<sup>th</sup>-year medical students and 2<sup>nd</sup>-year nursing students, which simulated a clinical approach for hospitalized patients by both medical and nursing students. Previous research O'Carroll V [1] showed that interprofessional practice learning (IPPL) helped students learn to work together in a relevant context and prepare for future interprofessional collaboration. However, it is unclear whether the students' experience and learning through interprofessional education (IPE) affects their identity formation and professionalism. In this study, we conducted a multi-occupational team simulation training including undergraduate students from both the medical and nursing departments and clarified the changes in professional identity and attitudes after IPE.

## 2. Study Design

We introduced an elective collaborative class of 4<sup>th</sup>-year medical students and 2<sup>nd</sup>-year nursing students, which was conducted using a role play approach for hospitalized patients with acute abdomen using an advanced patient simulator (SimMan<sup>®</sup> 3G, Laerdal Medical Japan, Tokyo) in the simulated patient's room at a clinical skills training center. Thirty nine 4<sup>th</sup>-year medical students (average age, 23.0 years) and 48 2<sup>nd</sup>-year nursing students (average age, 20.1 years) joined this class and were randomly distributed to the educational intervention group (20 medical students and 20 nursing students) and the control group (19 medical students and 28 nursing students). The educational group underwent a special training, as described below. We administered an evaluation questionnaire to both groups before and after the role play, including a vocational identity scale [2] including four subscales, a scale for professionalism [3] including five subscales, a readiness for interprofessional learning scale (RIPLS) [4], and interdisciplinary education perception scale (IEPS) [5].

## 3. Statistical Analysis

Among the scores on the vocational identity scale, the scale for professionalism, occupational identity, RIPLS, and IEPS, we calculated the average of 6-point scores for each item and compared them between medical and nursing students and before and after the practice using a Wilcoxon signed rank test. Significance was set at  $P < 0.05$ . We used IBM SPSS Statics Version 26 to analyze these data.

#### 4. Ethical Considerations

The students were given oral explanations of the objective of the study, as well as assurance that it would not affect their academic achievements. Enrolled students provided consent to participate in the study by clicking on the “Consent” button on the last page of the questionnaire. This study complied with the rules of the Ethical Committee of Wakayama Medical University.

#### 5. Educational Content in Role Play in the Clinical Approach for Simulated Hospitalized Patients

Patient: Fifty-year-old female.

Past history: Not particular.

Family history: Father and mother were healthy. No brothers or sisters. Married, no children.

Preference history: No smoking, no drinking.

Physical findings: Height, 160 cm; weight, 62 kg; blood pressure, 120/80 mmHg; pulse rate, 90 beats/min; body temperature, 36.0°C; face appearance, pale and sweating; SpO<sub>2</sub>, 98%; consciousness, clear; palpebral conjunctiva, anemic; ocular conjunctiva, no icterus; neck and chest, no abnormality; abdomen, bulge, no tumor, pressure pain in the left lower abdomen, no defense, normal intestinal peristaltic sound; no leg edema.

Present history:

She had repeated diarrhea and constipation 1 month ago, and blood stool. She was diagnosed with colon cancer by colonoscopy. She was hospitalized for operation for stage III a sigmoid colon cancer the day before yesterday. Hospital meal: 1800 kcal normal adult meal, no infusion or oxygen inhalation. She complained of left lower abdominal pain this afternoon, which increased gradually, with shorter intervals between pain episodes, and exhibited chills and sweating. She called a nurse using the calling bell.

Role playing:

The nursing student visited the patient’s room and registered the complaint and history, followed by a physical assessment. Subsequently, the nursing student called her doctor (medical student) and transmitted the clinical information. The medical student confirmed the complaint and history, then performed an additional physical assessment. Finally, the nursing and medical students discussed the patient’s physical condition, established a diagnosis, and planned for further examination and treatment. An advanced patient simulator (Sim-Man<sup>®</sup> 3G, Laerdal Medical Japan, Tokyo) was used to simulate a patient with the programmed physical condition described above in the physical findings. This simulator can mimic the physical condition according to the scenario. Facilitator answered the clinical questions of the students in place of the patients.

Time schedule for role playing:

Briefing, 10 min; physical assessment by nursing students, 8 min; transmission of clinical information from the nursing to the medical student, physical assessment by

the medical student, and discussion, 10 min each; debriefing, 10 min (Figure 1).

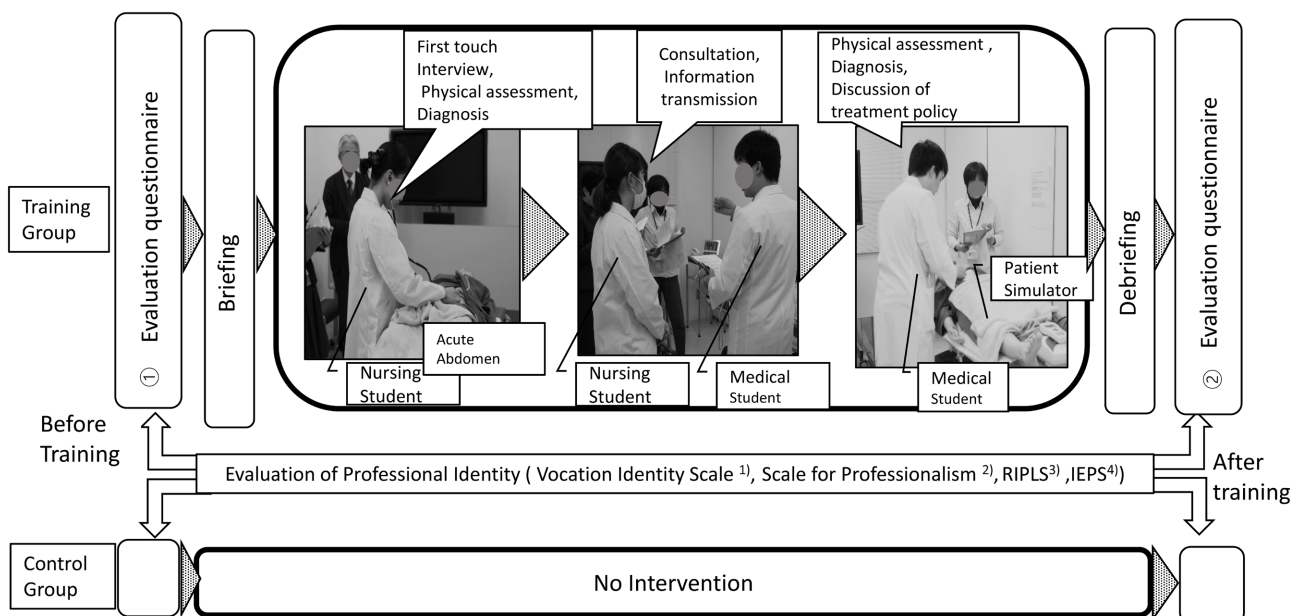
Outcome of training:

Performance of an appropriate physical assessment and clarification of the patient's signs and symptoms; finally, to identify the cause of the abdominal pain. Non-technical outcome, effective communication and ethical attitude.

## 6. Results

The scores for confidence in the selection and growth of medical profession, pride toward being considered necessary as a medical profession, and orientation for social contribution in the vocational identity scale were significantly higher in medical students compared with nursing students. In contrast, improvement of practical attitude, improvement of living attitude, and spirit of compliance in the scale for professionalism scored higher among nursing students vs. medical students (Table 1).

Among medical students, IPE training increased the score on the "Establishing a view of medical profession" and "Pride towards being considered necessary as a medical profession" subscales included in the "Vocational identity scale," and the "Improvement of learning attitude" subscale included in the "Scale for professionalism." Furthermore, medical students showed no changes in the score on the PIPLS, and an increase in the score on the IEPS. Among nursing students, IPE training improved the scores on the "establishing a view of the medical profession" subscale in the vocational identity scale, "formation of personality" subscale of the scale for professionalism, RIPLS, and IEPS. In the control group, medical students showed worsening of the score on the "spirit of compliance" subscale of the scale for professionalism, improvement of the score on the of RIPLS, and worsening of the score on the IEPS (Table 2).



**Figure 1.** Role play of clinical approach for hospitalized patients with acute abdomen using advanced patient stimulator.

**Table 1.** Scores on questionnaires among medical and nursing students.

Scale		Before training		P Value
		Medical students (N = 39)	Nursing students (N = 48)	
Vocational identity scale	Confidence in selection and growth of medical profession	5.22 ± 0.71	4.75 ± 1.17	0.012
	Establishing a view of medical profession	4.78 ± 0.94	4.53 ± 1.16	0.062
	Pride towards being considered necessary as a medical profession	4.56 ± 0.98	4.21 ± 1.04	0.041
	Orientation for social contribution	5.53 ± 1.03	5.15 ± 1.11	0.04
Scale for professionalism	Formation of personarity	21.53 ± 4.58	20.81 ± 4.03	0.114
	Improvement of learning attitude	43.35 ± 8.59	45.12 ± 8.05	0.164
	Improvement of practical attitude	28.64 ± 6.11	32.10 ± 5.39	0.003
	Improvement of living attitude	28.83 ± 5.76	32.80 ± 5.39	0.016
	Spirit of compliance	26.61 ± 4.92	27.27 ± 4.38	0.005
RIPLS		66.65 ± 11.67	68.02 ± 12.66	0.141
IEPS		3.82 ± 10.71	4.05 ± 0.63	0.007

The differences in scores between medical and nursing students were evaluated using the Wilcoxon signed rank test. Significance was set at  $P < 0.05$ .

**Table 2.** Scores on the questionnaires in the training and control groups of medical and nursing students.

Scale		Medical Student					
		Interprofessional Training Group (N = 20)			Control Group (N = 19)		
		Before Training	After Training	P Value	Before	After	P Value
Vocational identity scale	Confidence in selection and growth of medical profession	5.45 ± 0.74	5.56 ± 0.62	n.s.	5.21 ± 0.71	5.14 ± 0.75	n.s.
	Establishing a view of medical profession	5.08 ± 0.47	5.43 ± 0.47	0.014	4.68 ± 0.75	4.66 ± 0.87	n.s.
	Pride towards being considered necessary as a medical profession	4.88 ± 0.57	5.22 ± 0.61	0.032	4.43 ± 0.87	4.43 ± 0.85	n.s.
	Orientation for social contribution	5.82 ± 0.72	5.64 ± 0.60	n.s.	5.47 ± 0.65	5.32 ± 0.64	n.s.
Scale for professionalism	Formation of personarity	22.25 ± 3.57	23.35 ± 2.58	n.s.	21.68 ± 3.82	21.37 ± 0.38	n.s.
	Improvement of learning attitude	44.95 ± 6.69	47.30 ± 4.61	0.045	43.53 ± 6.32	42.47 ± 5.74	n.s.
	Improvement of practical attitude	29.89 ± 5.72	29.84 ± 4.36	n.s.	28.53 ± 4.16	27.68 ± 4.77	n.s.
	Improvement of living attitude	29.85 ± 4.11	30.15 ± 3.83	n.s.	29.00 ± 4.56	27.63 ± 3.86	n.s.
	Spirit of compliance	26.30 ± 3.56	26.15 ± 2.83	n.s.	26.00 ± 3.58	24.68 ± 4.04	0.024
RIPLS		70.50 ± 6.35	72.60 ± 5.86	n.s.	65.58 ± 6.23	67.05 ± 6.21	0.024
IEPS		3.50 ± 0.67	4.11 ± 0.46	<0.001	4.16 ± 0.37	3.67 ± 0.75	0.001

		Nursing student					
Scale		Interprofessional Training Group(N = 20)			Control Group (N = 28)		
		Before Training	After Training	P Value	Before	After	P Value
Vocational identity scale	Confidence in selection and growth of medical profession	4.68 ± 1.00	4.69 ± 0.83	n.s.	4.92 ± 1.02	5.07 ± 0.73	n.s.
	Establishing a view of medical profession	4.33 ± 0.79	4.64 ± 0.68	0.031	4.82 ± 1.18	4.75 ± 0.78	n.s.
	Pride towards being considered necessary as a medical profession	4.25 ± 0.79	4.41 ± 0.75	n.s.	4.31 ± 0.98	4.61 ± 0.65	n.s.
	Orientation for social contribution	5.19 ± 0.77	5.19 ± 0.73	n.s.	5.30 ± 0.90	5.26 ± 0.62	n.s.
Scale for professionalism	Formation of personality	20.10 ± 2.32	21.75 ± 2.77	0.015	22.00 ± 2.68	21.39 ± 3.11	n.s.
	Improvement of learning attitude	44.40 ± 4.75	45.55 ± 4.74	n.s.	47.11 ± 4.50	47.04 ± 3.99	n.s.
	Improvement of practical attitude	32.55 ± 2.69	33.35 ± 1.84	n.s.	32.82 ± 2.86	32.82 ± 2.86	n.s.
	Improvement of living attitude	31.25 ± 2.71	31.10 ± 2.40	n.s.	31.46 ± 3.97	32.11 ± 2.47	n.s.
	Spirit of compliance	27.90 ± 0.45	27.95 ± 0.22	n.s.	27.75 ± 1.14	27.96 ± 0.19	n.s.
RIPLS		70.15 ± 5.05	76.20 ± 4.71	<0.001	68.68 ± 9.06	70.57 ± 5.83	n.s.
IEPS		4.03 ± 0.42	4.18 ± 0.35	0.024	4.07 ± 0.46	4.17 ± 0.41	n.s.

The differences in scores between before and after the training were evaluated using the Wilcoxon signed rank test. Significance was set at  $P < 0.05$ .

## 7. Discussion

Our class of 4<sup>th</sup>-year medical students and 2<sup>nd</sup>-year nursing students was adopted to cultivate readiness for IPE, occupational identity, and professionalism. Meyer *et al.* [6] showed in their report that an interprofessional high-fidelity pharmacology simulation had an impact on pharmacy and nursing students' perceptions of interprofessional and pharmacology knowledge. The present study was designed to clarify whether the simulated clinical approach for medical and nursing students can help develop occupational identity and professionalism. To evaluate occupational identity and professionalism, we used four subscales. The first scale was the vocational identity scale, which included the four factors mentioned by Erikson [7]; f1: choice of medical profession and confidence toward personal development; f2: establishment of a vocational outlook; f3: pride in dispensability in the workplace; and f4: desire to contribute to society, which were addressed in 31 questions. Fujii *et al.* analyzed the occupational identity of students in the nursing, physical therapy, occupational therapy, and radiological science faculties and reported different features for each type of student [2]. The second scale was the scale for professionalism, which is a 12-item self-reported questionnaire developed by Dokkyo Medical University. That study concluded that the early adoption of healthy behaviors had a positive effect on fostering educational professionalism among medical students [3]. The third scale was the

scale for readiness of health care students for interprofessional learning (RIPLS) developed by Parsell and Bligh [4]. It has been shown that this scale can be used to explore differences in students' perception of, and attitudes toward multi-professional learning. The fourth scale was the interdisciplinary education perception scale (IEPS), developed by McFadyen *et al.* [8], which included 18 items pertaining to the generalizability of the instrument; this revised model appeared to be stable for use among undergraduate students and showed good reliability.

Our study consisted in a scenario-oriented interprofessional educational program using an advanced simulator because of usefulness of simulation for inter-professional education [9]. We conducted a multi-occupational team simulation training of undergraduate students from both the medical and nursing departments and clarified the changes in professional identity and attitudes after the IPE. The scores on the vocational identity scale were higher among medical students vs. nursing students. In contrast, the score on the scale for professionalism and the IEPS were higher in nursing students compared with medical students in questionnaire before IPE. Burford *et al.* [10] showed that nursing students had consistently higher RIPL scores than did medical students at one site. The effects of the session on identity varied according to site and the dimensions of identity. Nursing students had consistently higher identity scores than did medical students. Although our data showed no differences in RIRL scores between medical and nursing students, there were differences in other scores between these student groups. The score on the vocational identity scale was higher in medical students vs. students. In contrast, the scores on the scale for professionalism and the IEPS were higher in nursing students compared with medical students in questionnaire before class.

Our results suggest that a multi-occupational team simulation training using an advanced patient simulator and clinical approach for hospitalized patients with acute abdomen was useful to improve the ability of "establishing a vocational identity," professionalism, readiness for interprofessional learning, and interdisciplinary education perception in both medical and nursing students. Although it was not clear in this study why the scores on the scales of vocational identity and professionalism were different between medical and nursing students, readiness or maturation for professionalism might be different in each group of students.

Simulation training yielded improvements that were more significant than were those of problem-based scenarios. Nursing schools and hospitals should incorporate simulation training, or at least problem-based scenarios, to improve medication safety [11]. Tofil *et al.* [12] showed that simulation was effective at improving healthcare students' knowledge and communication, and their study supported the hypothesis that interdisciplinary simulation improves each discipline's self-efficacy communication skills and understanding of each profession's role. Their results also showed the different effective on communication skill and professionalism for medical and nursing students.

The scores on the RIPLS in the medical training group showed no improvement because this score was higher in the training group vs. the control group before the administration of the training. In contrast, nursing students were remarkably motivated to engage in IPE by team training using an advanced patient simulator. In a review article, Richard showed that reflective practice interventions improved interprofessional education and collaborative practice [13]. As a reflective practice intervention was carried out in the present study, it might be useful to make a vocational identity and professionalism. The design of the present study adopted the IPE style. Odole reported that IPE was effective for teaching health profession students about the roles of different healthcare professionals in collaborative practice, as well as a significant association between participants' knowledge and perception of IPE [14].

Another important factor was the full-scale patient simulation setting and scenario. Escher *et al.* [15] reported that the recreation of clinical situations in a realistic setting should be the rationale for introducing full-scale patient simulators in training to improve patient safety. Although high-fidelity simulators mimic a wide range of human features, simulators differ from the body of a sick patient. The gap between the simulator and the human body implies a need for facilitators to provide information that would help the participants understand the scenarios. As our scenario included many patient documents, the facilitator could answer questions from the participants and fill the gap between the simulated setting and the real world.

## 8. Limitations

This study was a one-day practice, and the effect was localized. In addition, the survey on the preparation status of students of both faculties up to the practical training was insufficient.

## 9. Conclusion

On-the-job training using simulated clinical training by a multi-occupational team not only improved vocational identity and professionalism but also promoted the readiness and motivation to learn as an educational model of behavioral change.

## Authors Contributions

Takuzo Hano: Designed the study and wrote the article. Momoko Buyo: Took charge of classes and the questionnaire and performed the analysis. Naomi Iwane: Took charge of classes and performed the briefing and debriefing. Masato Mizukoshi: Took charge of classes and set up the simulator.

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lection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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