

Transprofessional Clinical Practice Improves Medical Students' Attitudes Towards Team Collaboration

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Research article

Keywords: medical student, teamworking, interprofessional education, transprofessional education, clinical practice

Posted Date: July 22nd, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-44279/v1>

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Abstract

Background Collaborative work between multiple health professions provides high quality health services and results in optimum outcomes, and interprofessional education is known as an effective strategy for improving attitudes towards interprofessional work. However, it has been repeatedly reported that physicians have poor attitudes towards collaboration with other health professionals, and how medical trainees develop their collaborative attitude during undergraduate education has not been examined in detail. The aim of this study was to investigate how medical trainees' collaborative attitude changes and whether educational intervention modifies this process.

Methods This was a cross-sectional study targeting first- (just after admission), fourth- (pre-clinical) and sixth- (prior to graduation) year medical students in seven medical schools in Japan, second-year residents in four medical school hospitals, and doctors in one university. A survey using the Japanese version of the Jefferson Scale of Attitudes Toward Interprofessional Collaboration was conducted from 2016 to 2017. The average score of each group, institution and gender, and the relationship between scores and length of teamwork courses and clinical clerkship were analyzed.

Results A total of 2504 (response rate 83.0%) responses were received. The average scores of first-, fourth- and sixth-year medical students, residents, and doctors were 110.1, 105.8, 105.6, 102.4, and 107.0, respectively. A three-way analysis of variance of students' scores showed that learning year, institution, gender, and the interaction between institution and learning year were significant variables. Scores of female students were significantly higher than those of male students.

The length of interprofessional education courses in preclinical years was significantly correlated with scores among fourth-year students, but not sixth-year medical students. The length of clinical clerkship was significantly correlated with scores among sixth-year medical students.

Conclusion Collaborative attitude towards teamwork was low among advanced year medical students and residents. Clinical practice with multiple professions in long-term clinical clerkship, which was classified as transprofessional education, might be the most effective intervention for improving attitudes towards collaboration among medical students.

Background

Collaborative work between multiple health professions provides high quality comprehensive health services and results in optimum outcomes with low patient mortality and high patient satisfaction [1–3]. However, collaborative relationships are hindered by undesirable expectations of other professionals' contributions and lack of communication. These challenges might be due to differences in recognition of one's own role and the role of other health professionals on the team, insufficient trust, lack of mutual respect for other professionals, and misunderstandings about collaborative work [4–7].

To raise awareness of team collaboration and respect for other professionals, various educational strategies have been introduced in undergraduate medical education [8–10]. Interprofessional education (IPE), defined by the Center for Advancement of Interprofessional Education (CAIPE) as “occasions when two or more professions learn with, from and about each other to improve collaboration and quality of care” [11], is known as an effective strategy for improving attitudes towards and readiness for interprofessional work [8–10]. Previous studies revealed that students’ attitudes and readiness for multi-professional shared learning were improved after IPE courses [12, 13]. In addition to IPE in the classroom, education with multiple professionals in the context of clinical practice, referred to as transprofessional education, was found to be an advanced effective strategy for team collaboration [14]. However, how medical trainees develop their collaborative attitude during undergraduate education has not been investigated in detail.

Hojat et al. developed three scales for evaluating attitude toward team collaboration, the Jefferson Scale of Attitudes toward Physician-Nurse Collaboration (JSAPNC) [15–17], the Scale of Attitudes Toward Physician-Pharmacist Collaboration [18], and the Jefferson Scale of Attitudes Toward Interprofessional Collaboration (JeffSATIC) [19], which can all be self-administered. Previous research revealed that physicians had more negative attitudes towards collaboration than nurses [20, 21] and pharmacists [18, 22]. In addition, region and gender were identified as influential factors since health professionals in America and Israel had more positive collaborative attitudes than those in Italy and Mexico [20, 21], and male medical students had more negative collaborative attitudes than female medical students and other health professional students [23].

To reveal the process of how young medical trainees form their attitudes toward team collaboration and how educational intervention and clinical experiences modify the process, we conducted a survey of Japanese medical students and residents in multiple institutions using the JeffSATIC.

Methods

Design

This was a multi-institutional cross-sectional study targeting first-, fourth- and sixth-year medical students, second-year residents, and medical doctors. The study had three objectives. The first was to establish the Japanese version of the JeffSATIC (JeffSATIC-J). The second was to reveal young medical trainees’ attitudes toward interprofessional team collaboration from admission to graduation, and after residency programs. The third was to elucidate the effects of educational interventions and clinical experiences on medical trainees’ attitudes.

Subjects

Since regionality and organizational characteristics are known as influential factors for team collaboration [24], seven medical schools were selected based on region, founders, and school mission.

Three of them were national schools (Gifu University School of Medicine; GU, Kyushu University School of Medicine; KyuU, Kagoshima University School of Medicine; KaU), and four were private schools (Showa University School of Medicine; SU, Kitasato University School of Medicine; KiU, Kanazawa Medical University School of Medicine; KMU, Jichi Medical University School of Medicine; JMU). Residency programs in four medical school hospitals (KyuU, KaU, KiU, KMU) were also selected.

JMU is a unique medical school that admits students from all over the country, and students get scholarships from their home prefectures that completely cover their entrance fees and tuition. After graduation, students are obligated to work for 9 years in their home prefecture, which includes 4 or 5 years at hospitals or clinics in rural areas.

The study targets of this research were all medical students immediately after admission (first year), students about to start clinical clerkship courses (fourth year), students who finished all clinical clerkship courses (sixth year), all residents who finished a 2-year residency program, and medical doctors at KaU Hospital.

Development of JeffSATIC-J

The original 20 items of the English version of the JeffSATIC [19] were translated into Japanese with the permission of the original JeffSATIC authors. Then, a translation expert back-translated the JeffSATIC-J into English, and the JeffSATIC authors confirmed the equivalence with the original items.

Cronbach's α coefficient was obtained and confirmatory factor analysis was conducted to examine the reliability and subscale structure of the JeffSATIC-J.

Data collection

An anonymous written questionnaire containing the JeffSATIC-J and items asking age and gender, and for doctors, length of clinical experience, was conducted from 2016 to 2017. Authors from each medical school explained the purpose and ethical considerations of this research, and collected the completed questionnaires. In consideration of the possible effects on students' education, medical students were asked to complete the questionnaire at the end of the academic year or after all teamwork courses were finished.

In addition to the questionnaire, information on courses related to teamwork and clinical practice in each medical school was also collected. According to CAIPE [11] and Harden's educational steps [14], teamworking-related courses were classified into:

- education for medical students only, in which medical students learn without any other health professions students;

- multiprofessional education without mutual interaction between students of different professions (MPE) (e.g. classroom lectures); and
- multiprofessional education with mutual interaction between students of different professions, in which students learn from and about each other (IPE) (e.g. case-based small group discussion, role-playing).

Also, courses in hospitals or other health care institutions were classified into:

- clinical observation, in which students observe interprofessional health care work but do not have any role in the delivery of care; and
- clinical clerkship, in which students have opportunities to function as members of the health care team in the delivery of care.

JeffSATIC-J score and related factors

Returned questionnaire responses with 16 or more JeffSATIC-J items answered were used for the following analyses. Following the JeffSATIC scoring algorithm, unanswered items were replaced with the mean score of other items completed by the same respondent. To clarify the factors associated with the JeffSATIC-J score, analysis of variance (ANOVA) followed by the Bonferroni procedure was carried out. To reveal the effects of educational intervention on JeffSATIC-J score, Spearman's rank correlation coefficient for the length of teamwork or clinical courses was analyzed. All statistical analyses were done at a significant level of 0.05 using SPSS version 21 (IBM, New York, NY).

Results

Responses were collected from 2514 of the 3016 target subjects. The number of responses with all JeffSATIC-J items answered was 2426 (80.4%), and the number with all JeffSATIC-J items and gender answered was 2333 (77.4%).

The number of responses with 16 or more JeffSATIC-J items answered was 2504 (83.0%). Among them, the number of medical student responses from GU, KyuU, KaU, SU, KiU, KMU, and JMU were 302 (98.4%), 275 (70.3%), 295 (82.9%), 362 (97.1%), 313 (91.8%), 256 (75.3%), and 335 (95.7%), respectively. The number of responses from first-, fourth- and sixth-year medical students, residents, and doctors were 778 (98.0%), 663 (80.8%), 697 (89.0%), 152 (79.6%), and 214 (50.1%), respectively (Table 1).

The ratio of female/male of first-, fourth- and sixth-year students, residents, and doctors were 248/507, 209/438, 224/461, 41/75, and 49/157, respectively. The average length of clinical experience among doctors was 14.02 (standard deviation [SD]: 8.03, range: 1–36) years.

Reliability and validity of JeffSATIC-J

Confirmatory factor analysis with promax rotation using the 2426 responses with all JeffSATIC-J items answered showed the identical two-factor structure, “working relationship” and “accountability”, as the original JeffSATIC. The α coefficient of the JeffSATIC-J was 0.88. We confirmed the reliability of the JeffSATIC-J and determined it was equivalent to the original scale.

JeffSATIC-J score

The average JeffSATIC-J scores of first-, fourth- and sixth-year students, residents, and doctors were 110.1, 105.8, 105.6, 102.4, and 107.0, respectively (Table 2).

A three-way ANOVA of students’ JeffSATIC-J scores showed that learning year ($P < 0.01$), institution ($P < 0.01$), gender ($P < 0.01$), and the interaction between institution and learning year ($F(12, 2045) = 9.045, P < 0.01$) were significant variables. Female students’ scores were significantly higher than those of male students. The Bonferroni procedure indicated that first-year students’ scores were significantly higher than other learning year groups in three medical schools, and that there was no significant difference between first- and sixth-year students’ scores in the other medical schools.

Significant differences were observed between JeffSATIC-J scores among the seven medical schools, even in first-year students who completed the questionnaire shortly after admission and prior to taking any teamwork courses.

A two-way ANOVA of residents’ JeffSATIC-J scores showed that institution and gender were not significant variables.

Educational characteristics of medical schools

As shown in Table 3, all medical schools implemented teamwork courses, but educational strategies, academic year offered (e.g. first-year course, third-year course), length, and sequence of the courses varied between institutions.

All medical schools implemented IPE. Six medical schools implemented IPE courses in preclinical years, KiU implemented an IPE course in clinical years, and JMU implemented an IPE course after all clinical clerkship courses were finished.

The length of clinical clerkship courses varied from 45 to 74 weeks, with JMU having the longest course duration.

JeffSATIC-J scores of fourth-year students and relationship with length of teamwork and clinical observation courses

Medical schools were ranked in order of the length of teamwork or clinical observation courses. Since KyuU provides elective courses of varying lengths, the same ranking was given to medical schools if the course length was the same or within the range of KyuU courses (Table 3).

Spearman's rank correlation indicated that JeffSATC-J scores of fourth-year students were significantly correlated with the IPE course provided in the fourth year. However, Spearman's rank correlation indicated that JeffSATC-J scores of fourth-year students were not significantly correlated with total length of teamwork courses provided in the previous 4 years, or any courses provided in the first, second, and third years (Table 3A).

JeffSATC-J score of sixth-year students and relationship with length of teamwork and clinical clerkship courses

The length of clinical clerkship courses was significantly correlated with JeffSATC-J scores among sixth-year students. Teamwork courses, especially IPE in preclinical years, were negatively correlated with JeffSATC-J scores among sixth-year students (Table 3B). JMU, which had the highest sixth-year student scores among all schools, implemented IPE immediately after the longest clinical clerkship courses and did not offer teamwork courses in preclinical years.

Discussion

Surveys targeting medical students and residents in multiple Japanese medical schools and hospitals revealed that female students and first-year students had more positive attitudes towards collaborative teamwork than male students and fourth- and sixth-year students who learned about teamwork as part of their formal curriculum. This study also indicated the importance of clinical experience in promoting collaborative attitudes.

Based on a theoretical and empirical study review, San Martín-Rodríguez et al. [24] elucidated three influential factors for successful team collaboration: systemic, organizational, and interactional determinants. Using these determinants, construction of medical trainees' collaborative attitude is discussed below.

Influence of systemic determinants on collaborative attitudes

The average JeffSATC score among American medical students was 115.5 [19], while scores among Japanese medical students ranged from 105.6 (SD 14.9) to 110.1 (SD 11.9). Since the effect size was 0.45–0.67, a significant difference between the two countries was suggested. Onishi et al. [25] reported that Japanese doctors had lower recognition of collaboration than American doctors based on JSAPNC

scores. This may suggest that Japanese students as well as doctors have more negative attitudes towards collaboration than American students.

Hojat et al. [21] concluded that culture might explain the differences between countries. Furthermore, the professional system, another systemic determinant for team collaboration, must be considered. In Japan, the Medical Practitioners' Act stipulates that medical acts can only be performed by nationally licensed medical doctors [26], whereas non-physician clinicians in the United States, such as physician assistants and nurse practitioners, can perform medical acts on behalf of physicians. Japanese culture and the professional system that formally determines professional superiority of licensed medical doctors can help explain the negative attitudes towards collaboration among Japanese medical students and doctors.

As this research indicated, female medical students' high affinity toward interprofessional collaboration was previously reported [19, 23]. However, gender was not a significant factor for residents in this study, suggesting that environment, education and clinical experiences could help modify collaborative attitudes.

Influence of organizational determinants, interactional determinants and education on collaborative attitudes

In addition to regional culture, organizational determinants, such as each organization's philosophy and shared values, and experiences provided by the formal educational program and informal activities at the institution might cause differences in attitudes towards collaboration. Organizational determinants could also explain changes in medical students' attitudes between undergraduate and residency programs.

Hansson et al. [23] reported that collaborative attitudes in Swedish medical students as evaluated by the JSAPNC were significantly more negative in the final year of medical school than in the first year. Because sixth-year students' scores were close to those of residents and doctors in this study, students gradually acquire a collaborative attitude as part of the socialization process in the medical community in the same manner as other professional values and attitudes.

IPE is known to be an effective educational strategy to enhance awareness of team collaboration as indicated by educational outcomes and adoption of collaborative experiences [8, 9]. In this study, JeffSATC-J scores among fourth-year students were high in medical schools that had a long duration of IPE in the fourth year. However, a long-term favorable effect of IPE in preclinical years on graduating students was not detected.

In this study, the length of clinical clerkship was significantly related to medical students' attitude at graduation. Students experienced teamwork with multiple professionals in the context of real practice, and this experience provided students with the opportunity to realize the necessity of team collaboration and to gain respect for other health professionals. Harden [14] explained that learning in clinical clerkship

courses is a transprofessional step of teamwork education, which is more advanced than multiprofessional or interprofessional steps. Frenk et al. [27] indicated the importance of transprofessional education in communities with multiple health workers. These learning experiences were categorized as interactional determinants for successful team collaboration [24], and this research supports the effectiveness of transprofessional experiences.

Sixth-year students at JMU had the highest JeffSATIC-J scores among the seven medical schools in this study. JMU also provides the longest clinical clerkship courses of the seven schools. In addition, all students worked for 7 weeks in a rural area after graduation. Furthermore, students took an IPE course at the JMU campus immediately after finishing all clinical clerkship courses. Wahlström et al. [28] reported that long-term education provided in the context of the clinical practice of medicine improves attitudes and skills related to collaboration with other health professions. Previous research indicates that informal interprofessional interactions on clinical placements is an effective method of team learning [29, 30]. Frenk et al. [27] suggested that interprofessional undergraduate education should be integrated into socialization and learning as part of a continuum of learning. JMU students' positive attitude towards collaboration might have been constructed by modeling and experiencing favorable teamwork as part of their clinical clerkship courses, and then reinforced by experienced-based learning in interprofessional group discussions.

Limitations

Since this was a cross-sectional study conducted at multiple medical schools, confounding factors that affect education should have been compared. Therefore, our conclusions should be discussed carefully and confirmed in a cohort study.

Conclusions

Japanese medical trainees' collaborative attitude towards teamwork could be influenced by culture, professional systems, and organizational factors. Even though students in their final year of medical school have lower collaborative attitude towards teamwork than first-year students, experience in clinical clerkships might facilitate their collaborative attitudes.

One medical school with a long clinical clerkship as a required course in community medicine and IPE in the final year had the most favorable attitudes towards team collaboration in both male and female graduating students. Transprofessional education in the community of practice and effectively organized curriculum might have favorable effects on medical students' attitudes towards collaboration.

Abbreviations

IPE: interprofessional education

CAIPE: Center for Advancement of Interprofessional Education

JSAPNC: Jefferson Scale of Attitudes toward Physician-Nurse Collaboration

JeffSATIC: Jefferson Scale of Attitudes Toward Interprofessional Collaboration

JeffSATIC-J: Japanese version of the JeffSATIC

GU: Gifu University School of Medicine

KyuU: Kyushu University School of Medicine

KaU: Kagoshima University School of Medicine

SU: Showa University School of Medicine

KiU: Kitasato University School of Medicine

KMU: Kanazawa Medical University School of Medicine

JMU: Jichi Medical University School of Medicine

MPE: multiprofessional education without mutual interaction between students of different professions

ANOVA: analysis of variance

SD: standard deviation

Declarations

Ethical approval and consent to participate

This research was approved by the Ethics Committee of Kagoshima University Graduate School of Medical and Dental Sciences (No. 630, 2016), as well as by the ethics committees of all other participating institutions. Respondents were informed that their cooperation was voluntary, that no personal assessment would be conducted, that no reward would be provided, that their identity and data would be protected, and that the results may be published. Returning a completed questionnaire was regarded as providing consent to participate in the study.

Consent for publication

All targeted medical students, residents and doctors received a written explanation of the possible publication of the research findings. Respondents who consented to participate were asked to return the completed questionnaire.

Availability of data and materials

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Funding

None.

Authors' contributions

KG was responsible for designing the questionnaire, performing the statistical analyses, and drafting the initial manuscript; MT made substantial revisions to the manuscript and supported KG in its development, including the search process; TS, MK, AT, HO, YM, RM, HC, YT and HS explained the research and distributed questionnaires to and collected completed questionnaires from the subjects at their institution; KT was responsible for the methodology of the statistical analyses. All authors have read and approved the final version of this manuscript for submission.

Acknowledgments

We would like to thank the respondents and everyone who supported this research.

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Tables

Table 1. Number of respondents and average age of groups in each institution.

Institution		First-year medical students				Fourth-year medical students				Sixth-year medical students			Second-year residents			Medical doctors		
		n	Response rate (%)	Age		n	Response rate (%)	Age		n	Response rate (%)	Age		n	Response rate (%)	Age		
				Mean	SD			Mean	SD			Mean	SD			Mean	SD	
GU	Total	109 (100)		19.1	2.5	104 (100)		24.0	5.4	89 (94.7)		27.0	9.0					
	Female	38		18.6	1.5	28		21.8	1.0	20		23.9	0.4					
	Male	69		19.3	2.8	76		24.8	6.1	68		27.9	10.0					
KyuU	Total	110 (100)		19.5	2.8	77 (64.7)		22.8	1.7	88 (86.3)		24.6	1.8	31 (51.7)		29.1	4.4	
	Female	22		19.8	3.6	12		22.8	1.4	14		24.1	1.0	10		29.1	5.8	
	Male	82		19.4	2.6	63		22.8	1.7	73		24.7	1.9	16		29.1	3.1	
KaU	Total	95 (90.5)		19.2	1.3	87 (70.2)		23.6	3.2	113 (89.0)		25.1	2.3	28 (100)		28.4	2.9	
	Female	33		19.1	1.0	38		22.7	1.1	45		24.7	2.1	5		28.0	3.0	
	Male	62		19.2	1.5	47		24.3	4.0	66		25.4	2.4	18		28.5	2.9	
SU	Total	119 (100)		18.8	0.8	114 (91.9)		23.6	6.9	129 (99.2)		25.0	1.4					
	Female	37		18.5	0.6	30		23.4	5.5	33		24.6	0.9					
	Male	82		18.9	0.8	79		22.9	1.2	95		25.1	1.5					
KiU	Total	120 (99.2)		19.4	1.9	88 (80.0)		23.9	3.3	105 (95.5)		24.6	1.8	56 (98.2)		27.1	1.7	
	Female	53		18.9	1.4	37		23.4	2.7	49		24.2	1.7	14		26.8	0.7	
	Male	67		19.7	2.2	49		24.3	3.7	54		24.9	1.8	22		27.4	2.1	
KMU	Total	104 (97.2)		19.9	1.4	74 (62.7)		24.5	2.7	78 (67.8)		26.6	4.2	37 (80.4)		28.5	2.5	
	Female	37		19.5	1.3	34		23.9	2.4	36		26.5	5.4	12		27.6	1.6	
	Male	57		20.2	1.4	38		24.9	3.0	40		26.7	2.7	19		29.0	2.8	
JMU	Total	121 (98.4)		19.1	1.3	119 (97.5)		22.3	1.5	95 (90.5)		24.8	4.5					
	Female	28		19.1	1.3	30		22.1	1.0	27		24.2	0.9					
	Male	88		19.1	1.2	86		22.4	1.6	65		24.4	1.3					
Overall	Total	778 (98.0)		19.3	1.9	663 (80.8)		23.5	4.2	697 (89.0)		25.3	4.5	152 (79.6)		28.2	3.0	
	Female	248		19.0	1.6	209		22.9	2.8	224		24.7	2.6	41		27.7	3.3	
	Male	507		19.4	2.0	438		23.6	3.6	461		25.5	4.3	75		28.4	2.8	

GU: Gifu University School of Medicine; KyuU: Kyushu University School of Medicine; KaU: Kagoshima University School of Medicine; SU: Showa University School of Medicine; KiU: Kitasato University School of Medicine; KMU: Kanazawa Medical University School of Medicine; JMU: Jichi Medical University School of Medicine; SD: standard deviation.

Table 2. JeffSATIC-J score by group and gender in each institution.

Institution		First-year medical students				Fourth-year medical students				Sixth-year medical students				Second-year residents				Medical doctors				
		n	Mean	SD	P-value	n	Mean	SD	P-value	n	Mean	SD	P-value	n	Mean	SD	P-value	n	Mean	SD	P-value	
GU	Total	109	113.0	9.9		104	105.8	13.5		89	107.3	14.1										
	Female	38	116.4	9.9	<0.01	28	105.6	13.5	0.92	20	109.9	14.1	0.36									
	Male	69	111.2	9.4		76	105.9	12.0		68	106.5	16.4										
KyuU	Total	110	106.7	11.1		77	113.4	11.3		88	106.6	12.5		31	103.3	12.0						
	Female	22	109.6	11.8	0.12	12	116.0	7.5	0.42	14	110.1	10.1	0.25	10	102.0	10.1	0.47					
	Male	82	105.6	10.3		63	113.0	12.0		73	105.9	12.9										
KaU	Total	95	109.5	11.4		87	108.5	14.1		113	106.9	13.5		28	105.2	19.5		214	107.0	14.4		
	Female	33	113.4	10.6	0.02	38	111.1	14.1	0.19	45	110.2	12.6	0.04	5	101.8	24.4	0.71	49	107.9	12.4	0.70	
	Male	62	107.4	11.3		47	107.0	13.5		66	104.7	13.8		18	105.6	17.0		157	107.0	15.0		
SU	Total	119	115.0	9.0		114	100.0	15.5		129	101.3	16.7										
	Female	37	116.5	9.2	0.24	30	98.4	12.0	0.51	33	107.2	14.5	0.02									
	Male	82	114.4	8.9		79	100.4	16.8		95	99.4	17.0										
KiU	Total	120	111.2	11.9		88	101.4	14.1		105	101.9	12.8		56	99.2	15.4						
	Female	53	112.2	12.8	0.41	37	104.0	13.9	0.17	49	104.8	11.6	0.04	14	102.1	15.6	0.08					
	Male	67	110.4	11.1		49	99.8	14.1		54	99.6	13.4		22	92.7	14.7						
KMU	Total	104	103.2	14.0		74	108.4	16.0		78	101.8	16.6		37	104.3	15.5						
	Female	37	106.4	12.0	0.14	34	114.3	13.0	<0.01	36	103.7	16.6	0.30	12	106.8	15.4	0.16					
	Male	57	102.0	14.9		38	102.9	16.8		40	99.7	16.5		19	99.3	12.0						
JMU	Total	121	110.9	11.3		119	106.3	13.2		95	114.7	12.4										
	Female	28	111.6	9.7	0.82	30	108.3	10.2	0.30	27	113.4	9.2	0.54									
	Male	88	111.1	11.6		86	105.4	13.8		65	115.2	13.3										
Overall	Total	778	110.1	11.9		663	105.8	14.6		697	105.6	14.9		152	102.4	15.9		214	107.0	14.4		
	Female	248	112.5	11.5	<0.01	209	107.7	13.6	0.03	224	107.9	13.7	<0.01	41	103.4	15.9	0.30	49	107.9	12.4	0.70	
	Male	507	109.2	11.7		438	105.0	15.0		461	104.5	15.4		75	100.3	15.4		157	107.0	15.0		

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Table 3. Spearman's rank correlation coefficient (ρ) between JeffSATIC-J score and length of courses related to teamworking or clinical practice.

(A) JeffSATIC-J score of fourth-year students

Institution	Courses related to teamwork														Clinical practice	
	First year			Second year	Third year			Fourth year			First-fourth year				First-fourth year	
	Medical students only (hrs)	MPE (hrs)	IPE (hrs)	Medical students only (hrs)	Medical students only (hrs)	IPE (hrs)	Medical students only (hrs)	MPE (hrs)	IPE (hrs)	Medical students only (hrs)	MPE (hrs)	IPE (hrs)	M/YPE (hrs)	Total (hrs)	Observation (hrs)	
GU	0	3	0	0	0	0	0	1.25	1.75	0	4.25	1.75	6	6	0	
KyuU	0	0	0	0	0	0	0	9-22	7-23	0	9-22	7-23	16-45	16-45	0	
KaU	0	0	0	15	0	0	0	0	22.5	15	0	22.5	22.5	37.5	37	
SU	0	0	19.5	0	0	4.5	0	0	4.5	0	0	28.5	28.5	28.5	0	
KiU	0	22.5	0	0	0	0	0	0	0	0	22.5	0	22.5	22.5	91	
KMU	1.5	0	0	0	0	0	1.5	0	20	3	0	20	20	23	200	
JMU	0	0	0	0	1.2	0	0	0	0	1.2	0	0	0	1.2	0	
Rank order	GU	3.5	6	3.5	3.5	3.5	3.5	3.5	6	3	2.5	5	3	2	2	2.5
	KyuU	3.5	3	3.5	3.5	3.5	3.5	3.5	7	6	2.5	6	5	5	5	2.5
	KaU	3.5	3	3.5	7	3.5	3.5	3.5	3	6	7	2.5	5	5	5	5
	SU	3.5	3	7	3.5	3.5	7	3.5	3	4	2.5	2.5	7	5	5	2.5
	KiU	3.5	7	3.5	3.5	3.5	3.5	3.5	3	1.5	2.5	7	1.5	5	5	6
	KMU	7	3	3.5	3.5	3.5	3.5	7	3	6	6	2.5	5	5	5	7
	JMU	3.5	3	3.5	3.5	7	3.5	3.5	3	1.5	5	2.5	1.5	1	1	2.5
p	0.20	-0.49	-0.61	0.41	0	-0.61	0.20	0.40	0.67	0.49	-0.04	0.11	0.13	0.13	0.10	
P-value	0.33	0.13	0.07	0.18	0.50	0.07	0.33	0.19	<0.05	0.13	0.47	0.41	0.39	0.39	0.42	

(B) JeffSATIC-J score of sixth-year students

Institution	Courses related to teamwork														Clinical practice		
	First-fourth year					Fifth year			Sixth year after CC	First-sixth year				First-fourth year	Fifth-sixth year		
	Medical students only (hrs)	MPE (hrs)	IPE (hrs)	M/YPE (hrs)	Total (hrs)	Medical students only (hrs)	MPE (hrs)	IPE (hrs)	IPE (hrs)	Medical students only (hrs)	MPE (hrs)	IPE (hrs)	M/YPE (hrs)	Total (hrs)	Observation (hrs)	Clerkship total (weeks)	Community (weeks)
GU	0	4.25	1.75	6	6	0	0	0	0	0	4.25	1.75	6	6	0	62	10-14
KyuU	0	9-22	7-23	16-45	16-45	3.3	0	0	0	3.3	9-22	7-23	16-45	19.3-48.3	0	59	1-5
KaU	15	0	22.5	22.5	37.5	0	0	0	0	15	0	22.5	22.5	37.5	37	59	1-12
SU	0	0	28.5	28.5	28.5	0	0	0	0	0	0	28.5	28.5	28.5	0	50	1-9
KiU	0	22.5	0	22.5	22.5	0	0.5	10.4	0	0	22.5	10.4	33.4	33.4	106	45	0-6
KMU	3	0	20	20	23	0	0	0	0	3	0	20	20	23	40	52	2
JMU	1.2	0	0	0	1.2	0	0	0	5.8	1.2	0	5.8	5.8	7	0	74	7-15
Rank order	GU	2.5	5	3	2	2	3.5	3.5	3.5	3.5	2	5	1	2	1	2.5	6
	KyuU	2.5	6	5	5	5	7	3.5	3.5	3.5	6	6	4.5	5	5	2.5	4.5
	KaU	7	2.5	5	5	5	3.5	3.5	3.5	3.5	7	2.5	4.5	5	5	5	4.5
	SU	2.5	2.5	7	5	5	3.5	3.5	3.5	3.5	2	2.5	7	5	5	2.5	2
	KiU	2.5	7	1.5	5	5	3.5	7	7	3.5	2	7	4.5	5	5	7	1
	KMU	6	2.5	5	5	5	3.5	3.5	3.5	3.5	5	2.5	4.5	5	5	6	3
	JMU	5	2.5	1.5	1	1	3.5	3.5	3.5	7	4	2.5	2	1	2	2.5	7
p	0.20	0.02	-0.64	-0.80	-0.80	0.00	-0.20	-0.20	0.61	0.19	0.02	-0.87	-0.80	-0.76	-0.35	0.88	
P-value	0.34	0.48	0.06	<0.05	<0.05	0.50	0.33	0.33	0.07	0.35	0.48	<0.01	<0.05	<0.05	0.22	<0.01	

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