First-year Medical Students’ Attitudes toward Health Care Teams:  
A Comparison of Two Universities Implementing IPE Programs

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Abstract
Aim: First-year medical students’ attitudes toward health care teams were compared between Sapporo Medical University and Gunma University, to evaluate the effect of the student placements in community health on the attitudinal change toward collaborative practice (CP).
Methods: The modified Attitudes Toward Health Care Teams Scale was used to measure the attitudes of medical students from Sapporo Medical University and Gunma University. The scale was subjected to exploratory factor analysis to examine the underlying constructs of the survey.
Results: The questionnaire was categorized into three subscales. The regression factor scores of “Quality of care delivery” were significantly reduced at both universities, while those for “Patient-centered care” trend toward an increase at both universities after subjects. Interestingly, there was no significant difference, with almost the same levels in all subscales, after the subjects between the two universities.
Conclusions: Medical students may rather expect high values of CP from the viewpoints of care providers at the entry level. The interprofessional education (IPE) program can contribute to their awareness of the values. Finally, the additive effects of community placement in the IPE program could not be revealed for only one year.

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Background
With the chronic shortage of health professionals and the specialization of each profession, the introduction of interprofessional education (IPE) programs has become a pressing issue for many educational institutions responsible for producing experts in the fields of health, medicine, and welfare.1 The World Health Organization (WHO) report, “Transforming and Scaling Up Health Professionals’ Education and Training: World Health Organization Guidelines 2013,” clearly lists IPE as one of its 11 recommendations.2 However, the implementation of inefficient and episodic IPE programs would simply increase student burden. Therefore, efficient and systematic IPE programs, which implement scientific-research-based evidence and demonstrate improved long-term outcomes under varied circumstances, are indispensable.3
In many educational institutions in Japan, undergraduate clinical education remains focused on hospitals.4 In contrast, interprofessional student placements in community health offer an alternative to traditional clinical education. Recently, studies have reported evidence that students gain teamwork skills and knowledge of the roles of other specialists through community health placements in an early stage of the curriculum.5 Notably, the three themes of “It Takes a Team,” “Bounc-
ing ideas,” and “Realities of Community Health” were identified in thematic analyses of medical and nursing students for interprofessional learning, thus supporting the expansion of the capacity for clinical education beyond hospital placements. The Gunma University WHO Collaborating Centre for Research and Training on Interprofessional Education (JPN-89) has strategically supported the IPE program established at the University of Health Sciences in the Lao People’s Democratic Republic (Lao PDR) in collaboration with the WHO. The resultant IPE program was constructed by embedding IPE components into the pre-existing community-based education program—that is, student placement in community health. A statistically significant increase was found in students’ attitudes toward the value of collaborative practice (CP) in a randomized controlled study.

Among the universities implementing IPE programs as an advanced initiative, Gunma University has delivered a multi-professional education subject (MPE subject) which is lecture-style subject, for first-year medical and health sciences students since 1997. In addition, IPE subject which is practice-style subject, has also been delivered to third-year health sciences students since 1999. As a result, these students can learn through IPE program which is comprehensive program with IPE subject and MPE subject. However, the university’s first-year medical students only studied MPE subjects, together with health sciences students, as a compulsory subject until 2016. Sapporo Medical University has systematically delivered IPE subject, including community health placements for first-year medical and nursing students since 2004.

Interestingly, our previous study found that health science students of Gunma University studying a lecture-style subject showed negative attitudes toward health care teams. Conversely, those learning in a practice-style subject showed positive attitudes toward both health care teams and IPE itself, elucidating an interesting insight into the unrealistic expectations of first-year students in the early stages of their education. Unfortunately, the number of nursing students participating in the IPE program of Sapporo Medical University was not large enough to ensure significance of the results of statistical analysis. There is still great debate about when and how to introduce IPE in undergraduate curricula. Other reports have shown the contribution of the style of educational delivery to students’ attitudes toward interprofessional learning. Then previous study reported limitation which we need to implement longitudinal design or multi-institution study. Therefore, in the present study, first-year medical students’ attitudes toward health care teams were compared between Sapporo Medical University and Gunma University, to evaluate the effect of the student placements in community health on the attitudinal change toward CP.

### Methods

#### 1. Study design

The present cross-sectional study was a descriptive investigation designed to test the effects of IPE programs. This study included the effect of community health placements on students’ attitudes toward health care teams by comparing the attitudes of medical students between Gunma University and Sapporo Medical University.

#### 2. Study population

Gunma University enrolled 120 students from its Department of Medicine while Sapporo Medical University enrolled 110 students from its Department of Medicine to participate in this survey in 2015 and 2016, respectively. The present study was performed in the 2015 and 2016 academic year: the students in 2015 were a different population from those in 2016. Accordingly, students responding to the survey before and after the IPE program differed to an extent.

#### 3. Study setting

1. **Curricula delivered at both universities**

   The educational contents of all departments at both universities were constructed according to the basic structure/minimum requirements set by the Ministry of Health, Labour and Welfare and approved by the Ministry of Education, Culture, Sports, Science and Technology for graduating students to obtain the right to take the national examination and become registered medical professionals. As a result, the fundamental educational content was similar between the two universities.

2. **IPE program at Gunma University**

   Gunma University has developed a curriculum based on holistic medicine and CP, as described previously. Briefly, two mandatory, lecture-style subjects are delivered to first-year students. The objective of the first subject, "Holistic Medicine/Teamwork Studies", is to develop medical ethics and awareness of patient-centered team care. The objective of the second subject, "Interprofessional Work Overview", is to understand the history of team care and the practicality of a team approach in the healthcare and medical care setting. These two subjects consisted of total 15 consecutive two-hour lessons. Medical students evaluated in the present study were not exposed to any aspect of the IPE program, including community placement.

3. **IPE program at Sapporo Medical University**

   At Sapporo Medical University, two initiatives have been individually undertaken by each medical and nursing school for first-year students. The first is a residential community internship program under which students are requested to stay in a remote community for a certain period of time. The second is a team-based training program under which students’ capacity to cooperate with other professionals is expected to improve. A joint curriculum of the schools, "a team-based residential community internship program," was initiated in 2004.

   The team-based residential community internship
program uses the town of Betsukai as its model community, as it suffers from a scarcity of medical services. Students from the medical and nursing departments form a team; they stay in remote areas in eastern Hokkaido and undergo preparatory training in advance. During this training period six months prior to the main program, the students take relevant classes taught not only by medical personnel but also by staff from the municipal administration. Student groups also prepare themselves for self-learning programs and interactive seminars on health education. Under the program in the communities, the student groups organize health education seminars for the prevention of diseases and the promotion of health, targeting local schoolchildren and the community’s elderly. This exercise is expected to help students from different departments acquire fundamental professional ethics and attitudes to understand and respect toward other professionals, as well as help them appreciate the importance of community healthcare using the team-based approach. The program provides communication opportunities for students with the academic staff—particularly those from other departments—thus exposing students to diverse views.

4. Survey instruments

Heinemann et al.16 developed the Attitudes Toward Health Care Teams Scale (ATHCTS), a 21-item instrument to evaluate clinically based team training programs. It can be used as a pre- and post-test tool for educational interventions with teams. A modified 14-item instrument that removed items containing the word “physician” from the original instrument was created by Curran et al.17 to measure attitudes toward health care teams. Subsequently, we used a Japanese version of this 14-item instrument in our survey.10,11,18,19 Responses were rated on a five-point Likert scale ranging from one (strongly disagree) to five (strongly agree), in accordance with Curran et al.,17 where a high score indicates a positive attitude toward healthcare teams. The modified ATHCTS has not yet been fully analyzed for reliability and validity regarding the measurement of attitudes toward health care teams, although a high internal consistency (Cronbach’s alpha of 0.77) with a clear factor solution with three subscales was obtained in our previous research.10,19

5. Study procedure

Immediately after entering university, that is, before the IPE program, and after completion of the IPE program, the modified ATHCTS was administered to first-year undergraduate medical students at both universities in 2015 and 2016. For each university, data from the 2015 and 2016 academic years were separately combined before and after the IPE programs.

6. Statistical analysis

Data from undergraduate medical students at Gunma University and Sapporo Medical University were analyzed using the Japanese version of IBM SPSS software for Windows, Version 25.0. The scale was subjected to exploratory factor analysis (EFA) to examine the underlying constructs of the survey. The suitability of the correlation matrix was determined by the Kaiser-Meyer-Olkin (KMO) test of sampling adequacy and Bartlett’s Test of Sphericity. The initial factor extraction was performed using principal component analysis. Furthermore, to clearly define the structure, an EFA using a varimax rotation was conducted.

The regression factor score was computed for the item identified to represent the modified ATHCTS using the varimax rotation method. To determine differences in associations of the resultant factors with the attitudes of medical students at Gunma University and Sapporo Medical University, regression factor scores were obtained for the scale used in the present study.20 Since the data were not normally distributed according to the Shapiro-Wilk test, the Mann-Whitney U test was used to analyze the independent variables. The level of significance was set at 5% for all the tests.

7. Ethics

This study was approved by the Epidemiologic Research Ethics Committee of Medical and Health Research Involving Human Subjects of Gunma University (approval number 2016-107) and Sapporo Medical University. This survey was administered to the undergraduate students and supervised by the professors responsible for each class. We informed the aim, method, contents of research cooperation, benefit and risk of this study. Then we informed that participation in this study is voluntary and if the student wish to participate, he/she is not obliged to answer all the questions and he/she is free to withdraw his/her participation at any time. We also informed that the survey results have no impact on participants’ academic performance. Survey responses were kept confidential, and names and other identifying information were removed for analysis.

Results

1. Demographics of respondents

Just after entering university, before the MPE subject, 237 respondents (120 and 117 in 2015 and 2016, respectively) out of a possible 240 students in Gunma University completed the survey, for a total response rate of 98.75%. Moreover, after the MPE subject, 196 respondents (101 and 95 in 2015 and 2016, respectively) completed the survey, for a total response rate of 81.67%.

At Sapporo Medical University, before the IPE subject, 204 respondents (97 and 107 in 2015 and 2016, respectively) of a possible 220 students completed the survey, for a total response rate of 92.72%. Then, after the IPE subject, 170 respondents (81 and 89 in 2015 and 2016, respectively) completed the survey, for a total response rate of 77.27%.

2. Exploratory factor analysis (EFA)

The KMO index was 0.89, indicating sampling adequacy, and the Bartlett Sphericity chi-square index was
Table 1  Exploratory factor analysis of modified ATHCTS

| Item | Label | Factor loading |
|------|-------|----------------|
| 8    | The interprofessional approach improves the quality of care to patients/clients. | \(0.69 \quad 0.29 \quad 0.13\) |
| 3    | The give and take among team members helps them make better patient/client care decisions. | \(0.68 \quad 0.15 \quad 0.19\) |
| 14   | Team meeting foster communication among members from different professions or disciplines. | \(0.68 \quad 0.14 \quad 0.15\) |
| 5    | Developing a patient/client care plan with other team members avoids errors in delivering care | \(0.63 \quad 0.20 \quad 0.11\) |
| 4    | The interprofessional approach makes the delivery of care more efficient. | \(0.52 \quad 0.28 \quad 0.17\) |
| 12   | Having to report observations to a team helps team members better understand the work of other health professionals. | \(0.51 \quad 0.41 \quad 0.10\) |
| 1    | Patients/clients receiving interprofessional care are more likely than others to be treated as whole persons | \(0.32 \quad 0.31 \quad 0.01\) |
| 10   | Health professionals working as team are more responsive than others to the emotional and financial needs of patients/clients. | \(0.20 \quad 0.70 \quad 0.07\) |
| 13   | Hospital patients who receive interprofessional team care are better prepared for discharge than other patients. | \(0.13 \quad 0.66 \quad -0.07\) |
| 11   | The interprofessional approach permits health professionals to meet the needs of family caregivers as well as patients. | \(0.32 \quad 0.64 \quad 0.12\) |
| 7    | Working in an interprofessional environment keeps most health professionals enthusiastic and interested in their jobs | \(0.32 \quad 0.53 \quad 0.01\) |
| 2    | Developing an interprofessional patient/client care plan is excessively time-consuming. | \(0.24 \quad 0.12 \quad 0.73\) |
| 6    | Working in an interprofessional manner unnecessarily complicates things most of the time. | \(0.28 \quad 0.21 \quad 0.55\) |
| 9    | In most instances, the time required for interprofessional consultations could be better spent in other ways. | \(0.00 \quad -0.17 \quad 0.32\) |

* Modified ATHCTS (Curran et al, 2007) was used as the instrument.

* Items were numbered according to Makino et al (2013).

* Negatively worded items were reverse-scored to calculate.

3530.77 \((p<0.001)\), convincingly rejecting the null hypothesis that the correlation matrix was an identity matrix and thus unsuitable for factor analysis. The modified ATHCTS questionnaire was categorized into the following three subscales: "Quality of care delivery," "Patient-centered care," and "Team efficiency," in accordance with Hayashi et al. (2012)\(^6\) which reported the same structure, with Cronbach’s alpha measures of 0.82, 0.77, and 0.52, respectively (Table 1). The factor solutions corresponded well with a previous study that was categorized into the following three subscales: Quality of care delivery, Patient-centered care, and Team efficiency with Cronbach’s alpha measures of 0.71, 0.67, and 0.42, respectively, by Hayashi et al. (2012).\(^{10}\)

### 3. Regression factor scores

As shown in Figure 1, the regression factor scores for Quality of care delivery and Team efficiency were reduced significantly after the MPE subject at Gunma University (0.27±0.75 to \(-0.10±0.96, p<0.05\), and 0.15±0.76 to \(-0.03±0.85, p<0.05\), respectively). Interestingly, the regression factor scores for Quality of care delivery were also significantly reduced (0.13±0.85 to \(-0.08±0.86, p<0.05\)) after IPE subject at Sapporo Medical University. However, the regression factor scores of the Patient-centered care subscale were significantly augmented after MPE subject at Gunma University (\(-0.31±0.89\) to \(-0.06±0.87, p<0.05\)).

Comparing the two universities, before the MPE/IPE subjects, the regression factor scores for the Team efficiency subscale at Gunma University were significantly higher than those at Sapporo Medical University (0.15±0.76 vs. \(-0.01±0.75, p<0.05\)). Unexpectedly, there was no significant difference in all subscales after the MPE/IPE subjects between the two universities.
Discussion

The regression factor scores of Quality of care delivery and Team efficiency were significantly reduced after training at Gunma University. A reduction involving Quality of care delivery was also observed at Sapporo Medical University, indicating that the reduction of attitude scores toward health care teams categorized into this subscale may be common to the two medical schools. These negatively inclined attitudes of first-year students were also observed in health professional students. The attitude toward QCD may be categorized into that toward “Quality of care delivery.” In particular, in a previous survey of first-year health sciences students at Gunma University, the reduction was shown for the same subscale of “Quality of care delivery.”

The relatively high-level attitudes toward IPE among first-year students have been reported to result from “unrealistic” high expectations from IPE. The attitude toward QCD may be categorized into that toward “values of IPE for health care providers” in the instrument used here. However, through interactions with patients, students realized that health professionals also had to gain a better understanding of the patient’s psychosocial needs. It is therefore suggested that medical students may not necessarily be disappointed by CP, but rather expect high CP values from the viewpoints of care providers at the entry level. This may be confirmed by the results of the negative response to the factor, “Team efficiency,” especially among students from Gunma University.

The regression factor scores of “Patient-centered care” trend toward an increase after the MPE/IPE subjects. In particular, the regression factor score of the subscale at Gunma University was significantly improved. Hoffman and Harnish reported that first-year students learning mandatory IPE had a meaningful positive change in attitudes toward CP. An introductory, team-based, 14-week IPE course improved students’ self-assessed competency in learning objectives. In contrast, it is noteworthy that the values of this subscale were relatively low at the entry phase at both universities. The attitude toward “Patient-centered care” may be categorized as “values of CP for health care receivers, i.e., values for patients or clients” in the instrument used here. The realities of community health capture the nuances of the everyday reality of working in community health. This was challenging for practitioners in finding alternatives to the students. Interprofessional collaboration is important for improving patient outcomes and patient safety and IPE offers a possible way to improve patient care. These results suggest that medical students may not be interested in the values of CP for patients or clients just after admission to the university, and MPE/IPE subjects may contribute to their awareness of the values.

It is very interesting that there was no significant difference between the two universities, which showed almost the same levels on all subscales, after the MPE/IPE subjects. We expected that students learning the IPE program under community placement might show significantly higher scores than those learning only MPE subjects. The reason that why students from both universities showed almost the same attitudes toward CP is uncertain at present. It is likely that Gunma University medical students spend their school career at the same campus where the health sciences students study, and the School of Health Sciences there delivers a comprehensive IPE program. Interaction with these students and educational staff, which would constitute a hidden curriculum, might have contributed to fostering the CP mindset to the same level as that shown by medical students at Sapporo Medical University. Alternatively, we note that medical schools have recently introduced subjects fostering CP in response to the global movement. The additive effects of community placement in the MPE/IPE subjects did not become apparent during the year-long observation period. It is possible that the length of time was insufficient. Further evaluation, including a longitudinal approach, might be necessary in response to the
global movement.

Conclusions

The regression factor scores of the "Quality of care delivery" were significantly reduced at both universities, suggesting that medical students may not necessarily be disappointed by CP, but rather expect high CP values from the viewpoints of care providers at the entry level. However, the regression factor scores for "Patient-centered care" were improved at both universities after the MPE/IPE subjects, especially at Gunma University, suggesting that while medical students may not be interested in the values of CP for patients or clients just after admission to the university, MPE/IPE subjects may contribute to their awareness of these values. It is noteworthy that no significant difference between the two universities was found on any subscale, with all scores at almost the same level, after MPE/IPE subjects. The additive effects of community placement in MPE/IPE subjects could not be revealed for only one year. Further evaluation, including a longitudinal approach, will be necessary.

Limitation

One of the limitations of the present study is its cross-sectional design, which does not reveal changes over time. Only a few studies have evaluated the changes in IPE over time. Previously, we conducted a longitudinal study describing a comprehensive IPE program in which the reduction of the attitudes toward CP in first-year students was recovered to significant improvement after the third-year IPE program. In the WHO Education Guidelines, the evaluation of the impact of IPE on health professionals’ practice is strengthened as research agenda. In particular, a longitudinal study, as reported by McFadyen et al. (2010), is necessary.

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Declaration of interest

The authors report no conflicts of interest.

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