

# Growth of medical students' future perspectives through field trip to a disaster area: a qualitative study using retrospective group interview

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## Research Article

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# Abstract

**Background:** Field trips to disaster-affected areas (FTDAs) with no specific purpose, such as medical cooperation, are widely undertaken in medical education. Although the educational effects of fieldwork where students may be assigned duties such as medical collaboration or support have been already revealed, those of these FTDAs remain unclear. The present study aimed to clarify what medical students gain from FTDAs.

**Methods:** Subjects were five medical students who participated in an FTDA at the Fukushima Daiichi Nuclear Power Plant (FDNPP) in Japan, at which hydrogen explosions occurred following the Great East Japan Earthquake, causing severe radiation contamination, to learn about the health concerns of restoration workers. The students went in 2017, and a retrospective group interview was conducted approximately two years later. Narratives about what they gained from the FTDA were extracted using open coding and interpreted.

**Results:** The following four main themes were identified: “Spirit of scientific inquiry,” which represents the knowledge and mindset required to read and examine the prevailing notions and government announcements critically; “Foundation for lifelong education and personal growth,” which represents that the experience of the FTDA was associated with recognising the importance of lifelong learning; “Diverse professionalism,” which suggests that the students gained insights into essential elements of becoming a medical doctor, and various perspectives on their future career choices; and “Importance of practicing medicine in the community setting,” which represents students’ recognition that, in the future, they may work in a region surrounding or near the FDNPP and that they may feel compelled to contribute to the region.

**Conclusions:** The students gained a broader perspective on their future jobs and careers through the FTDA. Medical educators should be aware of the educational benefits of FTDAs and employ them in their educational practices. Note that FTDA sites are not limited to the FDNPP. If medical educators can explain the importance of FTDAs to the residents of a disaster site and gain their understanding, various disaster-affected areas can be potential locations. Medical educators should understand the educational effects of FTDAs on students’ growth and effectively install FTDAs in their educational practices.

## Introduction

Visiting disaster-affected areas to interact with the residents and see the effects of a disaster is substantially more effective for medical student education than a lecture on the topic in a classroom[1]. The learning method in which students visit the field without being assigned specific roles, such as providing medical care, is generally referred to as a “field trip” (FT). It is different from “fieldwork,” where students may be assigned duties such as medical collaboration or support.

Although little is known about the medical educational effects of field trips to disaster-affected areas (FTDAs), those of fieldwork have been characterised as psychological growth[2, 3], as well as enhanced

professionalism and social responsibility[4, 5]. In line with these educational benefits of fieldwork, participating in FTDA may provide valuable insights that help medical students improve learning motivation and their career options.

To evaluate the effectiveness of education with experiential contents, the evaluation's timing is essential. Kolb[6] proposed the experiential learning theory, a circulation model consisting of concrete experiences, reflective observation, abstract conceptualisation, and active experimentation. This theory has been widely used in medical education such as in a study regarding the effects of early clinical exposure[7]. Because medical education can be viewed as a process of socialization[8], and senior medical students are more professionally competent[9, 10] than younger students, senior medical students are expected to be more skilled at reflective observation and abstract conceptualisation in experiential learning. Thus, the educational effects of FTDA in the early stages of education may be more accurately explained in retrospective evaluations conducted in the latter stages. Notably, in such evaluations, a qualitative research method is required to pursue the students' subjective accounts of their FTDA experiences.

The purpose of the present study was to investigate what insight medical students gained through participating in FTDA several years after a disaster, using a qualitative research method.

## **Methods**

### **Recruitment**

The subjects of this study were seven fourth-year medical students at Fukushima Medical University (FMU), Fukushima, Japan, all male, who had participated in a laboratory assignment. The assignment was a six-week intensive course on how to conduct scientific research, consisting of lectures, exercises, and practical training. The basic and social medicine departments oversaw this assignment. Although the program was compulsory, students could choose their preferred laboratory from a selection of programs offered. The subjects were comprised of individuals assigned to the authors' laboratory.

The fourth year of medical school at FMU is the last year before beginning bedside learning at the hospital, and is when the classroom lectures on basic medical knowledge, including radiation risk and medical treatment, are completed. The subjects were admitted to the university in 2013 and were living in Fukushima Prefecture at the time of the study. All subjects were over 20 years old; adults under Japanese law. Note that, as described later in this section, the final number of subjects enrolled was five.

### **Research design and setting**

In this longitudinal qualitative study, students participated in an FTDA to the Fukushima Daiichi Nuclear Power Plant (FDNPP) on February 7, 2017, as well as a retrospective interview conducted on December 17, 2018, to collect data regarding the educational effectiveness of the trip and what the students had gained from it. The FDNPP, the site of an accident caused by the 2011 Great East Japan Earthquake and subsequent tsunami, and its circumstances are considered to be representative of disaster-affected areas

in the recovery period following a disaster, given the severity of the damage caused to society; therefore, the FT to the FDNPP is classified as an FTDA in the present study. The students were in their sixth year at the time of the interview, the final year of medical school, and an appropriate time for retrospective and comprehensive evaluation of their FTDA experience.

The year 2017, when the FTDA took place, was a time when many evacuation orders in Fukushima Prefecture were scheduled to be lifted, resulting in a lot of press coverage with a tone of accelerated reconstruction. The restoration and tours of the FDNPP were managed by Tokyo Electric Power Company (TEPCO), who runs the FDNPP and has been accepting small groups of visitors since 2011, the year of the accident (2017 telephone interview with TEPCO spokesperson by the first author after FT to FDNPP; unreferenced). TEPCO initially did not allow young people to visit the plant for health and safety reasons, but relaxed the policy as radiation levels at the FDNPP's premises dropped to levels that did not affect health in 2016. Safety was also ensured in 2017 when the current study's subjects joined the FTDA.

The FT started with a briefing by a TEPCO spokesperson on the history of the accident and the recovery status. The visitors, including seven students and four teachers, then joined a bus tour of the FDNPP premises. The route included areas with clear traces of the accident, such as the Unit 1 and 2 buildings, where the hydrogen explosions occurred, and the coastline that was directly affected by the tsunami. After the bus tour, the exposure dose among visitors was checked for safety reasons. Next was a question and answer session with TEPCO spokespersons. The entire FT took about four hours.

Note that the subjects in the present study visited the disaster site itself, instead of the people it had affected. As shown in previous studies, disaster education often uses victims' first-hand accounts as educational content[11], and medical students are expected to empathise with these people through the narratives of their painful experiences[12], and thus understand them and the groups they represent. Therefore, what the students learn depends on these accounts. In contrast, an FT to a disaster site such as the FDNPP may enable students to acquire objective information about the disaster, regardless of victims' narratives. Visiting and observing the disaster site may have advantages over listening to narratives from the afflicted people, particularly in terms of understanding the reality, instead of an interpretation, of the disaster. Therefore, we chose the FDNPP as the target of the FT.

For the retrospective interview, a group interview was employed to facilitate a recall of past experiences among the subjects. The interview was conducted on December 17, 2018, with the first author as the moderator, in a conference room at FMU. Conversations were recorded using an IC recorder with the subjects' permission, and a verbatim transcript was made. The group interview began with the question "What did you gain from the experiences of the FTDA?". It is important to note that this group interview was not part of a regular curriculum; it was conducted in a context unrelated to the formal educational evaluation in the authors' institution. Thus, the students' grades or standing at the university would remain unaffected, regardless of the experiences they shared. The interview lasted approximately 60 minutes. Two subjects had scheduling conflicts and thus did not participate in the interview; thus, the final number of subjects was five.

# Analytic procedure

The transcript was inductively coded according to open coding[13], assigning labels to fragments of the transcript that had similar underlying meanings. A label could thus be merged into a larger concept; the initial sixty-seven fragments of students' accounts and conversations were summarized into four main themes finally. The four main themes reflected what the subjects had gained from the FT, as well as eight corresponding sub-themes, which had more concrete explanations regarding the subjects' evaluations of their experiences of the FT than the main themes. The students' accounts were quoted when a concrete episode was required to explain the content of each theme: the students' names were represented using the letters A to D for anonymisation.

## Results And Discussion

The main and sub-themes are shown in Table 1. The main theme "Spirit of scientific inquiry" represents the knowledge and mindset required to critically read and examine the prevailing notions and government's announcements. This main theme consisted of the sub-themes "Ability to perform objective judgment based on radiation knowledge" and "Knowledge regarding the situation of the FDNPP restoration." These sub-themes indicate that the subjects acquired specific knowledge and an increased interest in both radiation and the FDNPP. Whereas Konishi et al.[14] reported that radiation education after the FDNPP accident contributed to enhanced understanding of radiation and its health effects among students, the results of the present study suggest that the understanding of the actual situation of disaster areas through the FT led not only to knowledge, but also to more practical and behavioural abilities, such as objective judgment. In addition, the medical students in the present study may have acquired attitudes and mindsets appropriate for medical professionals through the FT, which may support the abovementioned abilities. The following excerpt from a student's account supports this:

Table 1

Themes and their detailed explanations about what medical students gained from the FT

Main theme	Sub-theme	Definition/Explanation
Spirit of scientific inquiry	Ability to perform objective judgment based on radiation knowledge	The ability to judge truth or falsity based on the scientific knowledge about radiation, critically examining current information such as media reports. This sub-theme emphasises the attitude of scientific inquiry in addition to scientific knowledge, as well as the perspective that such an attitude is also connected to the students' future.
	Knowledge regarding the situation of the FDNPP restoration	Updated knowledge regarding the actual situation of the FDNPP restoration. Assessment of the restoration progress can be included, and such assessment can be both positive and negative: the feeling that the recovery is going better than expected is a positive assessment, while the feeling that it will take a while to get back to normal is a negative assessment. In any case, medical students referred to their updated knowledge compared to the knowledge they had before the FT.
Foundation for lifelong learning and personal growth	Deeper understanding of the appeal of public health and preventive medicine	An enhanced understanding of the appeal of practical public/occupational health and preventive medicine that the medical students could not learn through lectures or on-campus training. In this sub-theme, medical students emphasise the importance of commitment to improving the target population's health, taking critical concepts of social medicine into account, such as the social determinants of health. This sub-theme suggests that the strengths of the field of public health and preventive medicine are meeting actual patients/workers through the FT.
	Enjoyment of problem finding and solving	Recognition of the fun in the act of problem finding and solving itself, not just in the context of medical practice. Medical students emphasised the process of gaining insight into the factors that inhibit and promote health through observation of workplaces, disaster sites, and the people who work in these settings. Discovering the excitement of the act of problem finding and solving seemed to motivate the effort required to sustain and refine the act.

Note: For the main theme "Importance of practicing medicine in the community setting," there was only one corresponding sub-theme; we generated this sub-theme and then labelled it as a main theme with the equivalent level of abstraction as the other main themes.

Main theme	Sub-theme	Definition/Explanation
Diverse professionalism	Image of a doctor who investigates the causes of the problem by gaining an understanding of their patient's lives	A broadened view of how to work as a medical doctor, with conviction that a medical doctor can improve the health problems by understanding the social background of their patient. This sub-theme is characterised by the interest in the holistic outlook of medical practice. Note that this sub-theme and the sub-theme "Deeper understanding of the appeal of public health and preventive medicine" in the "Foundation for lifelong education and personal growth" main theme both mention the "background" of workers, but they can be distinguished in that they have different emphases. This sub-theme emphasises career options among individuals, while the sub-theme "Deeper understanding of the appeal of public health and preventive medicine" emphasises the characteristics of the field of public health.
	Mental preparation by observation to clarify the ideal way to proceed	A theoretical design of the ideal way of working as a medical doctor through observation of medical doctors, university teachers, residents, and workers. This sub-theme includes medical students' realistic expectation that they cannot realise how one will work in the future until they start working as a medical doctor eventually; thus, medical students possibly understand the limitations of FTDA's educational effect on their career selection. However, the medical students emphasised the importance of having flexibility in their careers, realising that their interests can change in the future to something different from their current interests.
	Variety of ways doctors can support society	Insights into the ways medical doctors contribute to society, focusing on the status and value they hold in society rather than on their competencies, such as knowledge and skills. This sub-theme highlights the role of medical doctors as functional credential holders in society rather than as individuals.
Importance of practicing medicine in the community setting	The reality of medically underserved areas as a potential workplace	A sense of one's responsibility or mission considering the social situation regarding medical care in the affected area. The medical students assumed the possibility of their future work in this area, considering their life plans. These assumptions were possibly derived from more concrete and practical interest than the main theme "Diverse Professionalism."
<p>Note: For the main theme "Importance of practicing medicine in the community setting," there was only one corresponding sub-theme; we generated this sub-theme and then labelled it as a main theme with the equivalent level of abstraction as the other main themes.</p>		

"I became very interested in radiation and related subjects after the FT, and that the visit to the FDNPP was the catalyst. I think it is important to understand the actual situation scientifically; this may not only be about radiation, but also about other things related to medical work in my future." (Subject A, in the sub-theme "Ability to perform objective judgment based on radiation knowledge,")

The main theme "Foundation for lifelong education and personal growth" is comprised by the following sub-themes: "Deeper understanding of the appeal of public health and preventive medicine;" and "Enjoyment of problem finding and solving". This main theme emphasises that the experience of the FTDA was associated with recognising the importance of lifelong learning. The corresponding sub-

themes provide supporting information; an increased interest in public health and preventive medicine to reduce the risk of radiation exposure among FDNPP recovery workers, and enjoyment of problem finding and solving. The following excerpt suggests that interest in public health and preventive medicine, as well as the act of problem finding and solving, contributes to an expanded career path as a medical doctor:

“I have had many clinical courses in my practical training, the bedside learning program. However, it was not until I took part in the FT that I fully understood preventative medicine or public health. I gained an understanding that taking care of workers’ safety, for example, preventing industrial accidents, is one of the central issues in preventive medicine and occupational/public health. In order to support the health of workers, we need to know about their backgrounds, such as their working conditions and education level. It may become my life’s work” (Subject B, in the sub-theme “Deeper understanding of the appeal of public health and preventive medicine”)

This account suggests that medical students discovered the appeal of public health and preventive medicine, as well as the importance of problem finding and solving; As shown in the term “life’s work” in the excerpt, such appeal seemed to be associated with the recognition of necessity to continue lifelong learning.

Note that terms such as “working conditions” and “education level” mentioned in the above excerpt possibly refer to social determinants of health. Kasper et al.[15] pointed out the importance of a social medicine course in learning the social determinants of health; in the current study, the FTDA was held as part of a laboratory assignment in one of the institution’s social medicine courses, and may have worked as an opportunity for such learning in relation to radiation, health, and occupation.

The main theme “Diverse professionalism” includes the sub-themes, “Image of a doctor who investigates the causes of the problem by gaining an understanding of their patients’ lives,” “Mental preparation by observation to clarify the ideal way to proceed,” and “A variety of ways doctors can support society.” This main theme suggests that the students gained insights into essential elements of becoming a medical doctor, and various perspectives on their future career choices. For example, one subject associated his career path with his experience on the FTDA:

“My experience of the trip to the FDNPP had a lasting impression on me. There is a way of being a doctor who may not directly cure patients, but can contribute to workers’ health by paying close attention to background factors such as lifestyle.” (Subject A, in the sub-theme “Image of a doctor who investigates the causes of the problem by gaining an understanding of their patient’s lives,”)

Kaji et al.[16] reported that medical students who participated in seminars and drills on disaster medicine were overwhelmed by the harshness of the reality of the field requiring disaster medicine support and were thus less likely to consider disaster medicine as their future career. On the other hand, the student in the above excerpt seemed to actively connect his future career with his FT experience rather than shying away from it. Notably, the students in the present study visited the disaster site, while the students in Kaji et al.’s study [16] learned in the classroom. This difference suggests that learning at a disaster site may

expand students' future career options more than classroom learning. The following excerpt may support this suggestion. In this conversation, the subjects were asked about the association between their experience of the FTDA and their career path, and one student responded:

“In my case, before I entered medical school, I thought that the main job of a medical doctor was to perform surgery. However, after entering school, I learned various things and saw different paths. Honestly, I have decided on the department I want to go into, and the department has nothing to do with disaster medicine or radiology. After I get into it, I may develop an interest in other things. This development should be taken as a positive sign. The FT to FDNPP was an opportunity for me to discover such positive viewpoints and further possibilities of career options.” (Subject C, in sub-theme “Mental preparation by observation to clarify the ideal way to proceed”)

Although the excerpt above refers to the skills and tasks that characterise a medical department, one of the other students referred to the discovery of “Diverse professionalism” from the perspective of a medical doctor’s social status. The following example in the sub-theme supports this interpretation:

“It is rewarding to be of service to others, but that service is not limited to being thanked for curing illnesses. A medical doctor may contribute to an organisation with an installation criterion in law that requires the presence of a medical doctor just by belonging to it, since the organisation must need a professional with a license. In this way, if I can be useful as a doctor in helping others, I think I can contribute in various ways.” (Subject B, in sub-theme “Variety of ways doctors can support society.”)

Because medical doctors are recognised in society as people with specialised knowledge and skills, there are tasks and supervisory duties in the administrative and political systems that only medical doctors can perform; for example, a public health centre director must be a medical doctor in Japan [17]. The fact that the students in the current study have discovered that they can contribute to society, not only because of their knowledge and skills but also their qualifications, may enable them to expand their future options.

The medical students’ awareness of their future career options seemed to have expanded as they gained perspectives on diversity in relation to their future profession. Importantly, the students did not necessarily report interest in career paths such as disaster medicine, public health, or preventive medicine as a result of the FTDA. The FTDA may provide students with positive opportunities and perspectives at the beginning of their professional careers, even if the FTDA did not directly lead to a career choice.

The main theme “Importance of practicing medicine in the community setting” includes the sub-theme “The reality of medically underserved areas as a potential workplace.” In this main theme, students represented their recognition that, in the future, they may work in a region surrounding or near the FDNPP and that they may feel compelled to contribute to the region. These feelings seemed to have emerged according to knowledge on the regional characteristics:

“I had to go to the Hamadori area\* in Fukushima Prefecture for practical training after this laboratory assignment program. From the practical training, I realised the severity of medically underserved areas

and I thought that the FDNPP has had a big impact on the area. I am planning to work in Fukushima Prefecture after graduation, so I may stay and work in the Hamadori area. If I do, the impact of the FDNPP accident will be related to my work, although it may be indirect.” (Subject D, in the sub-theme “The reality of medically underserved areas as is a potential workplace,”)

\* Note: the Hamadori area is the coastal region of the Prefecture, on the east side. It is the region where the FDNPP is located and faced with limited medical resources.

This narrative characterised the current situation in the Hamadori area, where the FDNPP is located, as a region faced with limited medical resources. The student appeared to be integrating and sublimating his experiences from the FTDA and subsequent practical training, and then mentioned the relevance of his future job to such a situation. This mode of thinking, which considers a current situation as self-relatable in the future, is strongly associated with more accurate and desirable behavioural changes for learning[18, 20]. Considering these previous studies, we believe that FTDA may have an educational effect of enabling medical students to imagine specific future jobs, thereby facilitating relevant studies for those students.

Regarding the methodological implications of the present study, we should discuss that the retrospective group interviews conducted two years after the FT may have helped the medical students to recall their old experiences and to make sense of their studies; in other words, there may have been a “booster effect,” or promotion of effectiveness, in their medical education. Although the method for data collection may have inevitably functioned as an intervention, we believe that this method contributed to clarifying the past experience of the students rather than compromising the quality of the study design. The suggestion is that experiential learning, such as an FTDA, has increased educational effects when the students reflect upon it over time. The following two excerpts exemplify that the subjects hardly remembered the FTDA at the beginning of the group interview when the moderator asked them to talk about their experiences:

"To be honest, I do not remember much about it (laughing). Why? Because it's already been two years!" (Student D)

"Regarding my experience of the FT to the FDNPP, it's an old memory of mine, and so I cannot say for sure, but..." (Student E)

The subjects, however, gradually began to recall, elaborate, and make sense of their experiences as the interview progressed. Looking back over the years may lead to greater understanding, as shown in the themes in the results of the present study.

Regarding the applicability of FTDA, we argue that other universities and medical schools can implement FTDA under their educational resources to visit disaster-affected areas other than the FDNPP. Areas stricken by disasters such as floods, volcanic eruptions, and landslides may become sites for FTDA if the locals are willing. Note that FTDA should not become disaster tourism; a selfish and opportunistic

visit to a disaster-affected area that lacks consideration and respect for the local situation and residents[21, 22] and has even been described as a “medical shame.”[23] To avoid disaster tourism, FTDA(s) should be held after building trust with the residents, developing a sense of empathy among the students and the university. Since the medical students in the present study lived in Fukushima, FDNPP may have been a familiar place, giving them a sense of empathy. University should explain the importance and purpose of FTDA(s) to residents of disaster sites to build such a relationship with the local community for medical education.

The limitations of the present study are that there is room to explore how educational indicators such as career choices and learning performance are associated with what students gained from the FTDA; such an exploration could be a more practical contribution to medical education than the present study. Moreover, in qualitative research using interviews in general, it is desirable to pursue the subject’s psychological state, or its transition, more deeply by providing multiple opportunities to interview; however, in the present study, data was obtained through a one-time group interview. To reveal the transition process of career preferences among medical students, a longitudinal study should be conducted.

In conclusion, FMU medical students who participated in an FTDA in their fourth year retrospectively reported that they gained a broader perspective on their future work and career. It seems that through the FTDA, the students developed a better understanding of the environment and local community around the disaster site and its surrounding areas than before they joined the FTDA, as well as an expanded awareness of the diversity of ways in which doctors can contribute to society. Note that FTDA sites are not limited to the FDNPP. If medical educators can explain the importance of FTDA(s) to the residents of a disaster site and gain their understanding, various disaster-affected areas can be potential locations. Medical educators should understand the educational effects of FTDA(s) on students' growth, and effectively install FTDA(s) in their educational practices.

## Abbreviations

FT  
Field trip  
FTDA(s)  
Field trip to disaster-affected area(s)  
FMU  
Fukushima Medical University  
FDNPP  
Fukushima Daiichi Nuclear Power Plant

## Declarations

*Ethics approval and consent to participate*

All methods were performed in accordance with the Declaration of Helsinki. This study was approved by the Ethics Committees of Fukushima Medical University (Application No. 2019-032). Written informed consent was obtained from all the participants.

#### *Consent for publication*

Not Applicable.

#### *Availability of data and materials*

The datasets generated and/or analysed during the current study are not publicly available due to inclusion of personally identifiable information but are available from the corresponding author on reasonable request.

#### *Competing interests*

The authors declare that they have no competing interests.

#### *Funding*

No funding for this study to declare.

#### *Authors' contributions*

T.H. conceived of the study idea, collected and analyzed the data, and wrote the multiple versions of manuscript. S.E. and Y.M. commented and edited the manuscript. H.K. analyzed the data. T. K. conceived of the study idea and research design. T.F. supervised the study project, commented and edited the manuscript.

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