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Survey of dental hygienists' and dental hygienist students' attitudes toward body identification tasks of unidentified human remains

Short title: Invitation to the field of Forensic Odontology

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Acknowledgments

The authors wish to thank dental hygienists and students from all over Japan who cooperated with the questionnaire survey.

Conflict of interest

The authors declare that they have no conflict of interest.

Funding

This research work was funded by the institutional financial resources.

Statement of author contributions

N. I. and M.Y. conceived the presented idea. K. K. verified the efficient question method and contents. N. I. and H. K. verified the results and took the lead in writing the manuscript. N. I. encouraged H.Y. to investigate and supervise the findings of this task. All authors discussed the results and contributed to the final manuscript.
Abstract

Objective: Dental findings are used to identify unidentified human remains. The postmortem records, necessary for the appraisal of dental findings, are created by the dentist; however, a system for dental hygienists specializing in these tasks to utilize has not yet been considered.

Methods: This study was directed at both students at a dental hygienist school and dental hygienists. We conducted an awareness survey on their willingness to participate in these tasks, as well as the need for education regarding body identification tasks.

Results: The results showed that students and dental hygienists are highly interested in body identification tasks and highly motivated to participate. Numerous participants preferred to take courses regarding basic knowledge in both lecture and practical training settings to acquire the knowledge necessary for performing these tasks.
Conclusions: It is necessary to consider the curriculum content and timing of lectures and practices related to body identification tasks. Participation limited to the creation of postmortem records, except for the creation of antemortem records requiring diagnosis and treatment knowledge and the matching task of antemortem records and postmortem records, should be considered to prevent the tasks of dental hygienists from excessively expanding. If dental hygienists train properly, intraoral findings records can be drawn up by a team consisting of 1 dentist and 1 dental hygienist. Therefore, it is expected that the use of forensic dental identification, which is a relatively quick identification method, will be further improved.

**Key words:** forensic odontology; forensic dental identification; unidentified human remains; dental hygienist; Student in the dental hygienist school
One of the main tasks of forensic odontology is the identification of unidentified human remains using dental treatment marks (dental prosthesis and filling, etc.).\textsuperscript{1-5} Other scientific methods for body identification include DNA typing and fingerprinting.\textsuperscript{6-11} Forensic dental identification is not only effective for recently unidentified human remains but is also useful when mass disasters occur and cause numerous deaths. Therefore, the Disaster Victim Identification team (DVI) has been organized to promptly respond to disasters in various parts of the world. In Japan, the Emergency Response Team (ERT) is organized so that various emergency situations can be responded to immediately.\textsuperscript{12-18} Furthermore, in Japan, at the dental association in each prefecture, there is a dentist who specializes in a trained clinical area who can participate in body identification tasks. A number of these dentists have a basic knowledge of forensic odontology (depending on the curriculum of the university) that was acquired during their schooling and are optionally trained on forensic dental identification after they obtain...
their license.

However, there is no movement in Japan to promote participation in body identification tasks for dental hygienists who make medical treatment assistance one of their duties, and there is little opportunity to acquire the knowledge needed to perform these tasks. In forensic dental identification, when collecting intraoral findings from a corpse, two dentists mutually confirm their findings to prevent mis-description or omission. Therefore, if dental hygienists acquire the knowledge and skills related to body identification tasks, oral findings can be collected by one dentist and one dental hygienist, even when it is difficult for other dentists to join the site. These preparations are considered to have been a means to prevent confusion at the forensic dental identification site during large-scale disasters that have occurred in Japan so far. During the Great East Japan Earthquake, since it was impossible to perform body identification only by the dentists working in each affected area, system confusion occurred, in part, due to the large number of dentists who were trained on various methods of forensic dental
identification in other prefectures. Typically, body identification methods must be standardized in all areas, and dentists who are called from outside the disaster area must follow the instructions of the disaster area staff. Undoubtedly, it is necessary to establish a unified nationwide system, but it is also necessary to establish a system where specialists in the disaster area can deal with body identification tasks as much as possible. For this reason, it is important that not only dentists but also the 130,000 dental hygienists in Japan be trained in such methods. The participation of dental hygienists is perceived to be more efficient, further improving the usefulness of forensic dental identification. Furthermore, it is expected that the number of dentists who provide medical treatment, even at the time of disaster, can be secured.

In this study, we conducted an awareness survey of students at a dental hygienist school (hereafter called students) and dental hygienists, regarding their willingness to participate in these tasks, as well as the need for student education.
2. Study population and methodology

For this study, we conducted a questionnaire survey using multiple-choice and open-ended questions created by the authors (Table 1). Regarding the selection of candidates, the students in the dental hygienist school were recruited from two educational institutions in the Kanto region (vocational schools and junior colleges), and the dental hygienists were randomly recruited from all over the country. Written explanations were given to applicants; the explanatory document described the purpose, method of the research, and a brief description of forensic dental identification. Then, only the person who obtained consent from the explanatory document was requested to take the questionnaire. The number of respondents and the number of question items did not always match because there were missing answers. The obtained data were tabulated using Microsoft Office Excel 2016. The medical and ethical committees of Tokyo Dental College approved all the research protocols used in this study (approval number: 964).
Results

Since this questionnaire was distributed only to those who obtained consent for the survey cooperation, the recovery rate was 100%. The total number of valid responses was 238, including 100 students and 138 dental hygienists.

The effective response rate (students • dental hygienists) for each question was Q1: 100% • 100%, Q2: 100% • 100%, Q3: 96% • 95%, Q4: 100% • 100%, Q5-1: 100% • 99%, Q5-2: 78% • 72%, Q6: 98% • 99%, Q7: 100% • 99%, Q8: 100% • 97%, Q9: 99% • 99%, Q10: 98% • 100%, Q11: 100% • 99%.

Results of the students’ answers to the dental hygienist school questionnaire

Eighty-one percent of the participants were aware that forensic odontology was effective for body identification【Q.1】，and 77% of participants were interested in these tasks【Q.2】. In addition, 83% of participants showed a positive response regarding the participation of dental hygienists in body identification tasks【Q.3】. Regarding the requirement of task participation, 31% of participants answered that both the lecture and
the clinical experience should be a participation requirement, while 46% of participants (clinical experience only: 24%; lectures only: 22%) said only a clinical experience or lecture should be required. Moreover, 23% answered that both were unnecessary 【Q.4】. Seventy-eight percent of participants (yes, definitely: 14%; yes, if possible: 64%) showed a positive intention to participate in the actual field tasks 【Q.5-1】， and 12% wanted to participate preferentially in body identification tasks more than regular tasks 【Q.5-2】 (Figure 1). For the question on education, 100% of participants had no experience regarding lectures on body identification 【Q.6】. Seventy-nine percent of participants (yes, definitely: 14%; yes, if possible: 65%) showed a positive attitude about participating if a workshop for dental hygienists was held in the future 【Q.7】. In addition, 89% of participants considered it necessary to have training in both the lecture and practice style for participation in body identification tasks 【Q.8】， and numerous responses stated that both parts of training are appropriate after an individual becomes a licensed dental hygienist 【Q.9, Q.10】. Regarding the amount of knowledge
acquired, 71% of participants answered that they needed to learn the basics of forensic odontology 【Q.11】 (Figure 2).

Results of the dental hygienist questionnaire

Ninety-one percent of participants were aware that forensic odontology was effective for body identification 【Q.1】 , and 66% were interested in these tasks 【Q.2】 . In addition, 69% of participants showed a positive response regarding the participation of dental hygienists in body identification tasks 【Q.3】 . Regarding the requirement of task participation, 50% of participants answered that it is necessary to make both the lecture and the clinical experience into a participation requirement, and 33% (clinical experience only: 12%, lectures only: 21%) answered that only one or the other should be required; seventeen percent answered that both were unnecessary 【Q.4】 . Seventy-three percent of participants (yes, definitely: 6%, yes, if possible: 67%) showed positive intention to participate in the actual field tasks 【Q.5-1】 , and 14% wanted to participate preferentially in body identification
tasks more than regular tasks 【Q.5-2】 (Figure 3). For the question on education, 95% of participants answered that they had never gone to a lecture on body identification 【Q.6】. Seventy-nine percent of participants (yes, definitely: 10%; yes, if possible: 69%) showed a positive attitude about participating if a workshop for dental hygienists was held in the future 【Q.7】. In addition, 88% of participants considered it necessary to have training both in the lecture and practice style for participation in body identification tasks 【Q.8】 , and numerous responses stated that both parts of training are appropriate after an individual becomes a licensed dental hygienist 【Q.9, Q.10】. Regarding the amount of knowledge acquired, 64% of participants answered that they needed to learn about the basics of forensic odontology 【Q.11】 (Figure 4) .

Both students and dental hygienists were highly aware that dental findings are effective for body identification and had positive attitudes regarding dental hygienists' participation in body identification tasks. In addition, it was also recognized that both a lecture and practical training were
necessary to participate and that participants were highly motivated to learn.

On the other hand, several participants showed a negative attitude regarding participation in body identification tasks (student: 22% (no: 6%, not sure: 16%), dental hygienist: 27% (no: 12%, not sure: 15%)) 【Q.5-1】.

The following comments were raised as the reason for a negative attitude towards participating in body identification tasks 【Q.12】.

・ Not confident because the task has a heavy responsibility

・ There is a fear of the corpse

・ Concern for the mental burden during and after the task

・ Unease about acquiring an infection

・ Unable to judge the pros and cons of participation, at present, because they do not have any knowledge regarding forensic odontology

・ Not interested

・ Not sure that it will be at the level that we can perform tasks at as a dental hygienist

In addition, the following opinions were raised as general opinions
【Q.13】.

・It is better to make it possible for the applicants to participate after sufficient training.

・Japan has frequent natural disasters and a super-aged society, therefore, I hope that it will be a mandatory subject in school.

・It is necessary to introduce something like a certification system.

・The acquisition of knowledge is necessary, regardless of participation.

・Want to judge the presence or absence of participation after taking lectures

4. Discussion

Numerous mass disasters and acts of terrorism frequently occur across the globe. Japan has been affected in recent years, suffering from many natural disasters, such as the Great Hanshin-Awaji Earthquake and the Great East Japan Earthquake. The significance of forensic odontology, which takes on the task of returning the body of the victim who died suddenly due to these disasters, helps to relieve the great mental pain of the bereaved and
cannot be undermined. Dental hygienists and dentists are specialists in intraoral subject areas, and there are reports that they are encouraged to participate in body identification tasks after mass disasters. Therefore, we believe that it is necessary to prepare dental hygienists for these tasks, so they can receive the appropriate training regarding the collection of dental findings from a body, which is a major aspect of body identification tasks. The role of dental hygienists in these duties not only improves their professional status but is also a significant part of their service to the nation of Japan and the Japanese people. The results of the questionnaire showed that both students and dental hygienists were motivated to participate in body identification tasks. However, because there is a large psychological burden associated with collecting findings from a body, and these collected findings involve great responsibility, it is not a task that should be imposed on all dental hygienists and dentists. If a dental hygienist participates, both the dental hygienist and dentist need to collect findings as a team. Under Japanese law, dental hygienists can remove supragingival and subgingival
deposits and apply drugs, all of which have been diagnosed by the dentist and are instructed by the dentist in accordance with the planned treatment method. For this reason, regarding the creation of the antemortem record created using the dental record and the appraisal task to compare the antemortem record and the postmortem record, it is difficult for a dental hygienist who is not qualified in diagnosis and treatment, to participate; thus, the tasks of these dental hygienists should be limited to the creation of the postmortem record that is done using the collection of dental findings from the dead body. Therefore, it is not necessary for dental hygienists to receive the same training as the dentist.

The results regarding education showed that most of the respondents agreed that they need to learn in both a lecture and practice setting. As for the time of learning, the majority of the respondents answered that it is desirable to attend a lecture and then practice after becoming a licensed dental hygienist: however, 23% of students and 33% of dental hygienists preferred the lecture style [Q.9], and 28% of students and 20% of
dental hygienists preferred the practice style [Q.10], to be mandatory during the dental hygienist studentship (as a mandatory subject). Furthermore, 29% of students and 36% of dental hygienists answered that it is desirable to acquire only the minimum necessary knowledge regarding the scope of study [Q.11]. Therefore, it may be effective to provide an opportunity to acquire further practical knowledge only for those who recognize the necessity and wish to participate in body identification tasks after basic knowledge about forensic odontology is acquired during the studentship. Moreover, it is possible to keep a count of the dental hygienists trained to participate in body identification tasks in each prefecture by creating a licensing system and an accreditation system, both of which are opinions gathered from this study. As such, these approaches may be utilized as valuable tools.

5, Clinical relevance

5.1 Scientific rationale for the study

It is important to the bereaved family to have the body returned.
Forensic dental identification considers dentists and dental hygienists to play a part.

5.2 Principal findings

Students and dental hygienists have a desire to learn about these tasks. Before introducing the curriculum, we must discuss the time of learning and the amount of knowledge to be acquired. It should not be compulsory for dental hygienists and dentists to participate.

5.3 Practical implications

Forensic dental identification helps a body to be identified quickly. The participation of trained dental hygienists should lead to further benefits.

References


Figure Legends:

Figure 1. Results of the awareness survey on the participation of students in the dental hygienist school in body identification tasks (Q.1-Q.5-2)

Figure 2. Results of the awareness survey on the education of students in the dental hygienist school regarding body identification tasks (Q.6-Q.11)

Figure 3. Results of the awareness survey regarding the participation of dental hygienists in body identification tasks (Q.1-Q.5-2)

Figure 4. Results of the awareness survey on education regarding body identification tasks (Q.6-Q.11)
Fig. 2
Fig. 4
### Table 1. Questionnaire survey using multiple-choice and open-ended questions

| Q.1 | Do you know that dental findings are useful for body identification? (Yes / No) |
| Q.2 | Are you interested in the task of body identification that dentists do? (Yes / No) |
| Q.3 | What do you think about the participation of dental hygienists in the task of body identification? (Agree / Neither agree nor disagree / Disagree) |
| Q.4 | Do you think it necessary to set up the conditions for dental hygienists to participate in the task of body identification? (Clinical experience only / Lectures only / Both / Unnecessary) |
| Q.5-1 | Do you want to participate in an actual task of body identification if requested? (Yes definitely / Yes if possible / No / Not sure) |
| Q.5-2 | Which will you give priority in participating in, regular tasks or body identification? (Regular tasks / Body identification / Not sure) |
| Q.6 | Have you ever taken lectures or courses on body identification? (Yes / No) |
| Q.7 | Do you want to participate in a workshop for dental hygienists if held?  
(Yes definitely / Yes if possible / No / Not sure) |
|-----|---------------------------------------------------------------------|
| Q.8 | Which do you think is appropriate as a way of learning the knowledge required for the task of body identification?  
(Lecture only / Practice only / Both / Unnecessary) |
| Q.9 | In the case of the lecture style, when do you think is appropriate for learning?  
(During studentship, After being licensed, Unnecessary) |
| Q.10 | In the case of the practice style, when do you think is appropriate for learning?  
(During studentship, After being licensed, Unnecessary) |
| Q.11 | What do you think is the appropriate for the amount of knowledge to learn in the lecture?  
(Minimum necessary / From the basics of forensic odontology) |
| Q.12 | If you are reluctant to participate in the task, what is the reason? (free writing) |
| Q.13 | Other opinions (free writing) |