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Preliminary Evaluation of Information Sharing in COACHES*

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Abstract. Because of geographical, topographical and meteorological conditions, Japan is subject to frequent natural disasters such as typhoons, torrential rains and heavy snowfalls, as well as earthquakes and tsunami [4]. A team of University of Kochi launched a novel information management system COACHES (Community Oriented Approaches for Comprehensive Healthcare in Emergency Situations), which enables the efficient and quality provision care and relief to the all evacuees [7] [10]. In this paper, we evaluated prototype its web service information sharing among relief workers from the perspective of evacuees through questionnaires and interviews. We found that in order for COACHES to be operational in the field, evacuees need the ability to limit the type of relief workers who can see their information and the types of information they can release.

Keywords: Disaster support, Evacuee support, Rapid healthcare assessment, Information sharing, Web service.

1 Introduction

Japan is located in the Circum-Pacific Mobile Belt where seismic and volcanic activities occur constantly. Although the country covers only 0.25% of the land area on the planet, the number of earthquakes and active volcanoes is quite high. In addition, because of geographical, topographical and meteorological conditions, the country is subject to frequent natural disasters such as typhoons, torrential rains and heavy snowfalls, as well as earthquakes and tsunami [4].

In 2011, more than 18,000 people died or went missing due to the Great East Japan Earthquake. There is also a high probability of the occurrence of largescale earthquakes in the near future including impending possibilities of Nankai Trough Earthquake and Tokyo Inland Earthquake. As such, natural disasters remain a menacing threat to the safety and security of the country [4].

Shelters are established in the event of such a large-scale disaster. Shelters can be defined as a displaced neighborhood of convenience, providing physical shelter as well as social and medical services [11]. In fact, records show that approximately 410,000 people in Iwate, Miyagi, and Fukushima prefectures, and 470,000 people in total across Japan, lived in shelters after the Great East Japan Earthquake [5].

However, in the Great East Japan Earthquake, there were many problems arising during the disaster: affected people suffered health problems; aged people were forced to stay home because they could not adapt themselves to the evacuation shelters in some cases, relief supplies were not provided sufficiently to home evacuees in many cases; and there were reported problems for provision of information, relief supplies, and services for wide area evacuees who evacuated to other prefectures or municipalities [4].

Mr. Fujita said that currently, many of the shelters have no privacy and often have poor sanitary conditions. Under such circumstances, the staff of the shelter need to provide medical and health care to the evacuees. In addition, when the damage is particularly severe and the central disaster hospitals and mainstay medical institutions in the affected area do not function, or are too busy, medical care in the evacuation centers becomes important for a certain period of time [6].

In addition, the Disaster Relief Law stipulates that evacuation shelters should provide food and water through cooking and other means. For this reason, many evacuation centers distribute relief supplies.

However, in the immediate aftermath of the disaster, because of the chaos on the ground, there was a situation in which the production capacity of the suppliers could not keep up with the supply of goods due to overlapping procurement, or because of the concentration of orders to specific suppliers [8].

In addition, many of the survivors have chosen to evacuate from their homes instead of using the evacuation centers. According to a survey conducted by the Cabinet Office on the victims of the Great East Japan Earthquake, about 70% of the respondents had not visited an evacuation center [3].

Evacuees in shelters have some level of support system in place, including medical personnel and relief supplies, which makes it easier for them to receive assistance. In contrast, those who choose to evacuate at home tend not to be able to receive adequate support [9].

In order to address these issues, the University of Kochi School of Nursing in collaboration with the Kochi University of technology has launched a novel information management system COACHES (Community Oriented Approaches for Comprehensive Healthcare in Emergency Situations), which enables the efficient and quality provision care and relief to the all evacuees. We proposed a prototype of web service for the COACHES, which enables a secure and user-friendly data collection and reference in disaster settings [7, 10].

In this paper, we use the prototype of COACHES [7, 10] to conduct a preliminary evaluation of information sharing among relief workers from the perspective of evacuees through questionnaires and interviews, and present the findings from the results.

2 Related Research

A related study is an ICT-based shelter management system [2]. This system uses ICT to collect information on evacuees, create and disseminate lists of evacuees including their relief needs, and manage the evacuees. An electronic triage system has also been proposed [1].

The system will use the evacuee's own NFC cards for personal identification, and if they don't have one, the shelter will distribute NFC wristbands provided by the shelter. However, under this system, when evacuees come to an evacuation center, staffs have to go through the procedure of asking the receptionist if they have an NFC card and handing out wristbands to those who don't have one. The procedure would not be so complicated if the number of evacuees in shelters had settled down, but immediately after a disaster occurs, the number of evacuees in shelters is large and the situation is chaotic, so there is a possibility that people may line up at the reception desk. In addition, personal information, such as name and address, is required, so consideration must be given to those who may not feel comfortable entering this information. Also, the results of the electronic triage are displayed by the color of the light on the wristband with LEDs, which is visible to other people and does not provide sufficient privacy considerations.

3 COACHES

We proposed a prototype of web service for the novel information management system COACHES (Community Oriented Approaches for Comprehensive Healthcare in Emergency Situations), which enables a secure and user-friendly data collection and reference in disaster settings [7] [10]. An overview of this is presented in this chapter.

3.1 Flow of use

This system is intended to be used by evacuees who have been evacuated to shelters or evacuated at home, as well as healthcare professionals and Relief workers (Non-Medical Support) who provide support.

— Evacuees

QR codes for personal identification are routinely stored at evacuation centers, town halls, and disaster prevention warehouses, and are distributed to evacuees at evacuation centers and town halls in the event of a disaster. QR codes are distributed on wristbands and are intended to be carried at all times. Evacuees will present QR code to relief workers, if necessary. Following is information about evacuees to be recorded.

- Health conditions
 - Gender
 - Approximate age category
 - Physical status
 - Physical symptoms
- Vital signs
 - Body temperature
 - Pulse
 - Respiratory rate
 - Blood pressure (diastolic and systolic)
- Triage results

- Support history
 - Meal service (Time and place)
 - Receiving relief supplies (time, place, distribution group, category (foodstuffs, daily necessities, etc.), photos)
 - Bathing (Time and place)
 - Medical examination (Time, doctor in charge, remarks)
 - Legal/Welfare consultation (Time, responders, content (e.g., moving into a hypothetical home, inheritance issues, etc.))
- Shelter entry and exit records

— Healthcare professionals

First, healthcare professionals examine evacuees who has received the QR code, read the QR code, and record health conditions and vital signs. The vital signs recorded at this time will be used for primary triage. Then, healthcare professionals can view and edit the health conditions and vital signs by scanning the QR code of the evacuees at the time of examination. Also, when the QR code is scanned, the medical examination is recorded. The blue arrows in Fig. 1 indicate flow of use by healthcare professionals. Healthcare professionals have access to all information about the evacuees that is recorded in COACHES.

— Relief workers (Non-Medical Support)

First, relief workers register their support, such as food services and distribution of relief supplies, with the COACHES (Distribution group, Category (Foodstuffs, Daily necessities, etc.), Photos, etc.). Then, when providing support, they scan the QR codes of evacuees receiving support. Also, when the QR code is scanned, de-tails of support are recorded. Unlike healthcare professionals, relief workers are not allowed to edit information on evacuees. The orange arrows in Fig. 1 indicate flow of use by relief workers. Relief workers have access to evacuees' support history and shelter entry and exit records.

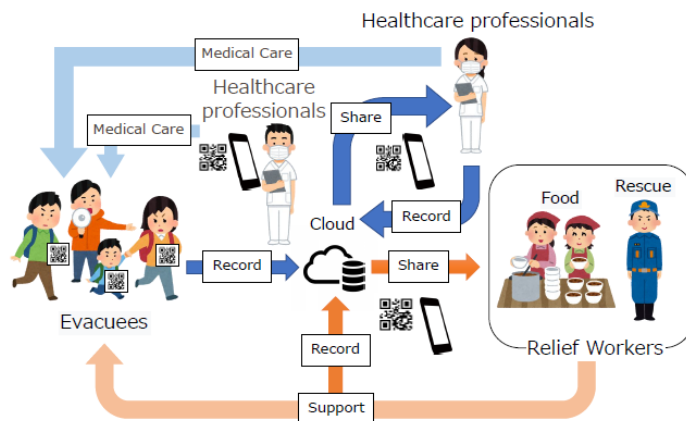


Fig. 1. Flow of use

(Dark arrows point to the flow of data and light arrows point to the flow of support.)

3.2 The prototype screens

Fig. 2 is a screen that displays the health condition of evacuees. Fig. 3 is a screen that displays the vital signs of evacuees. Fig. 4 is a screen that displays a history of the support received by evacuees and a record of their entry and exit from the shelter. Relief workers can only see Fig. 4 [7, 10].

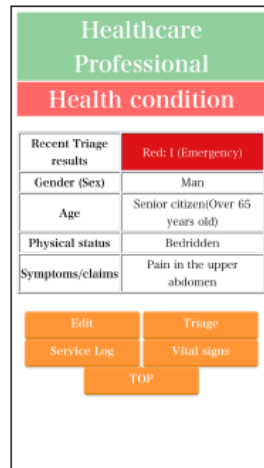


Fig. 2. Health conditions

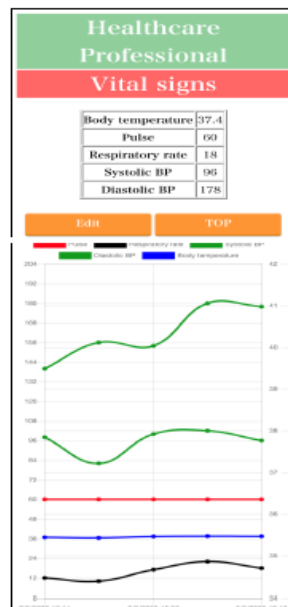


Fig. 3. Vital signs



Fig. 4. Service Log

4 Preliminary Evaluation of Information Sharing in COACHES

4.1 Survey method

In this study, seven students in their twenties (four males and three females) who had never experienced a large-scale disaster were briefed on the system using prototype of COACHES, and a questionnaire survey was conducted on information sharing among relief workers from the perspective of evacuees. The content of the questionnaire to be used in this process is shown in Table 1.

Table 1. Question item

Q1	<p>Would you be comfortable with relief workers (e.g., Healthcare professionals, Psychological counselors, etc.) referring to the information you have entered for efficient support?</p> <ul style="list-style-type: none"> • Uncomfortable • A little uncomfortable • Neither uncomfortable nor comfortable • A little comfortable • Comfortable
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Q2	<p>Do you think you want to limit the types of relief workers who can view your information?</p> <ul style="list-style-type: none"> • Agree • Agree a little • Neither agree nor disagree • Disagree a little • Disagree
Q3	<p>Do you think you want to limit your information that relief workers can view?</p> <ul style="list-style-type: none"> • Agree • Agree a little • Neither agree nor disagree • Disagree a little • Disagree
Question only for those who answered “Agree” or “Agree a little” in Q2.	
Q4	<p>Are you willing to share your information with following types of relief workers?</p> <ul style="list-style-type: none"> • Healthcare professionals • People distributing relief supplies (Meal, Daily necessities, etc.) • Shelter reception • Psychological counselors • Legal counselors • Care workers
Question only for those who answered “Agree” or “Agree a little” in Q3.	
Q5	<p>Are you willing to share following your information with healthcare professionals?</p> <ul style="list-style-type: none"> • Triage results • Gender • Approximate age category • Physical status (Pregnant, Disabilities, etc.) • Physical symptoms (Fever, Injury, etc.) • Vital signs (Body temperature, Pulse, Respiratory rate, Blood pressure (diastolic and systolic)) • Meal service log • Receiving relief supplies log • Bathing log • Shelter entry and exit log • Medical examination log • Legal/Welfare consultation log
Q6	<p>Are you willing to share following your information with relief workers?</p> <ul style="list-style-type: none"> • Meal service log • Receiving relief supplies log • Bathing log • Shelter entry and exit log • Medical examination log • Legal/Welfare consultation log

4.2 Survey result

The answers to Q1 of Table 1 (“Would you be comfortable with relief workers (e.g., Healthcare professionals, Counselors, etc.) referring to the information you have entered for efficient support?”) are shown in Fig. 5.

The results were four people who answered “A little comfortable” and three people who answered “Comfortable”.

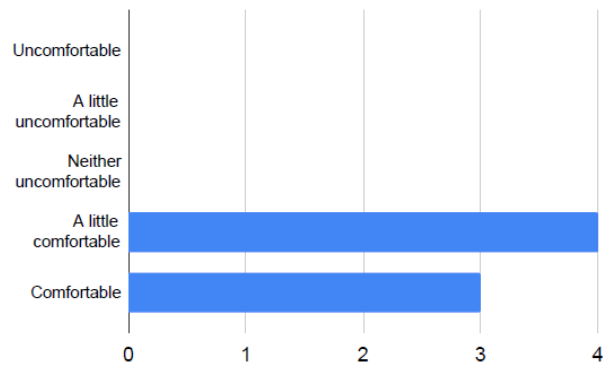


Fig. 5. Answers to Q1 of Table 1

The answers to Q2 of Table 1 (“Do you think you want to limit the types of relief workers who can view your information?”) are shown in Fig. 6.

The results were four people who answered “Disagree a little”, two people who answered “Agree a little” and one person who answered “Agree”.

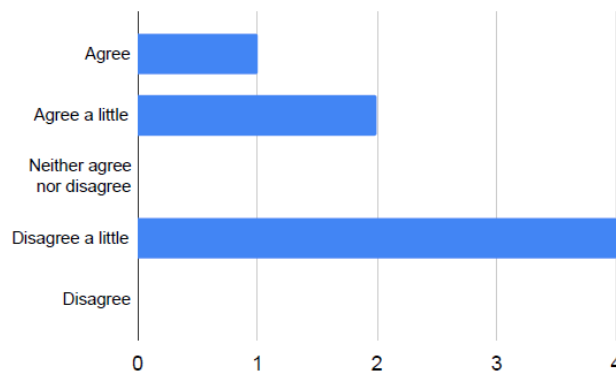


Fig. 6. Answers to Q2 of Table 1

The answers to Q3 of TABLE 1 (“Do you think you want to limit your information that relief workers can view?”) are shown in Fig. 7.

The results were five people who answered “Disagree a little” and two people who answered “Agree a little”.

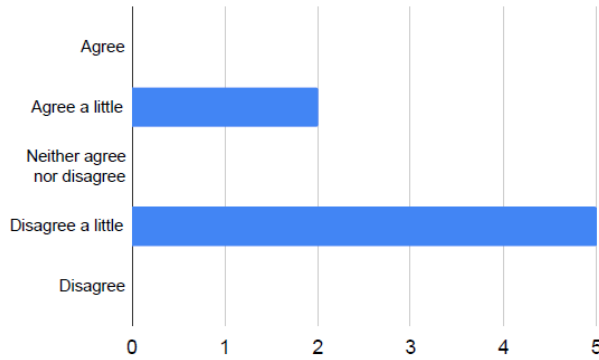


Fig. 7. Answers to Q3 of Table 1

The three people who answered “Agree” or “Agree a little” on Q2 of Table 1 (“Do you think you want to limit the types of relief workers who can view your information?”) were asked to answer Q4 of Table 1 (“Are you willing to share your information with following types of relief workers?”). The results are shown in Fig. 8.

For “Healthcare professionals”, all respondents answered “Yes”. For “People distributing relief supplies (Meal, Daily necessities, etc.)”, “Psychological counselors”, “Legal counselors” and “Care workers”, two people answered “Yes”. For “Shelter reception”, all respondents answered “No”.

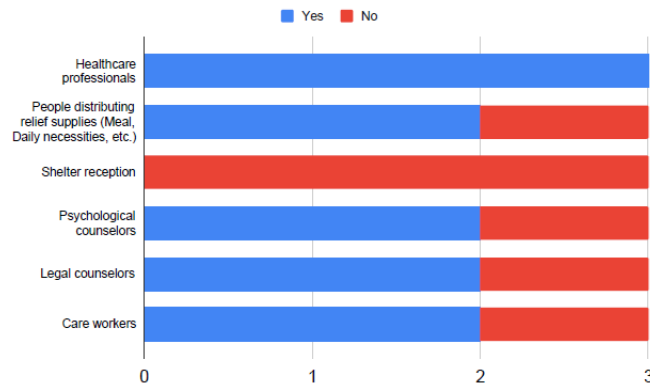


Fig. 8. Answers to Q4 of Table 1

The two people who answered “Agree a little” on Q3 of Table 1 (“Do you think you want to limit your information that relief workers can view?”) were asked to answer Q5

of Table 1 (“Are you willing to share following your information with healthcare professionals?”). The results are shown in Fig. 9.

The results were all respondents answered “Yes” to all items.

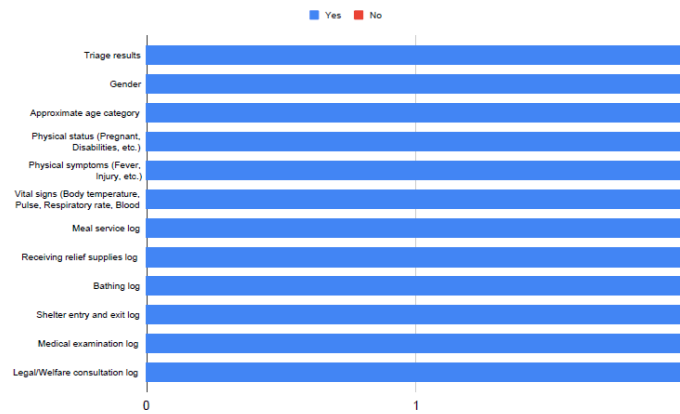


Fig. 9. Answers to Q5 of Table 1

In addition, we asked them to answer Q6 of Table 1 (“Are you willing to share following your information with relief workers?”) as well. The results are shown in Fig. 10.

For “Meal service log” and “Receiving relief supplies log”, all respondents answered “Yes”. For “Bathing log”, “Shelter entry and exit log”, “Medical examination log” and “Legal/Welfare consultation log”, one person answered “Yes”, but other person answered “No”.

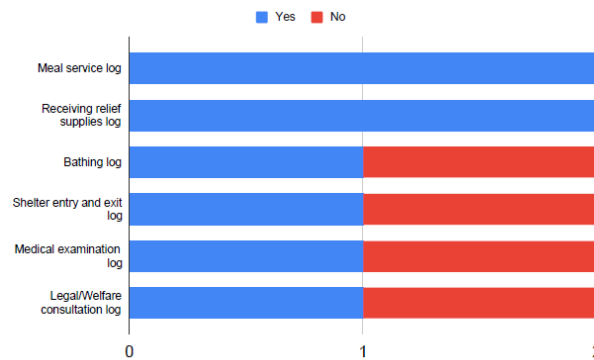


Fig. 10. Answers to Q6 of Table 1

4.3 Discussion

The results of this survey showed that many people who viewed COACHES from the perspective of evacuees were willing to have their information shared with relief workers. However, some respondents wanted to limit the types of relief workers who see the

information and the types of information that are released. Therefore, we found that evacuees are willing to allow their information to be seen, but wanted to control the extent to which it was made public.

In questions about the types of relief workers who share information (Q4 of Table 1), all respondents indicated that they are willing to share their information if they were a healthcare professional. Also, all respondents indicated that all healthcare professionals would be allowed to share all of the information recorded in COACHES. In contrast, some respondents did not want to share their information with relief workers except healthcare professionals. In particular, all respondents indicated that they did not want to share their information with receptionist at the shelter.

This result may be due to the fact that respondents could not imagine what kind of person would be in charge of the shelter's reception area. Healthcare professionals and psychological counselors are people with credentials and expertise, so evacuees can have some image of what they are like. In addition, it is possible that some respondents decided that it was not necessary to show the information to shelter's receptionist.

In questions about the types of information shared (Q5 and Q6 of Table 1), All respondents indicated that "Meal service log" and "Receiving relief supplies log" were acceptable to share. In contrast, some respondents did not want to share "Bathing log", "Shelter entry and exit log", "Medical examination log" and "Legal/Welfare consultation log". Respondents were interviewed in this regard. Despite wanting to limit the type of information shared, respondent who indicated that all information in COACHES is willing to share with relief workers were concerned that they did not know what information was being shared, rather than that there was information they did not want to be shared.

That respondent said "I think I would feel more comfortable sharing the information if I was presented with what the information would be used for." Also, Respondent who said they were only willing to share "Meal service log" and "Receiving relief supplies log" said "I was willing to share "Meal service log" and "Receiving relief supplies log" on the survey because there were many types of relief workers and they did not know exactly which information would be shared with whom, so they answered A and B that they were willing to share." Both opinions indicated that evacuees wanted to know which information was being shared with whom and for what purpose. We think this result because evacuees want to minimize the amount of information about themselves that is shared.

The above indicated that some evacuees would like the scope and type of information about themselves to be the minimum required. Also, we found that some people asked for an explanation in advance of what information would be shared and for what purpose. The results suggest that in order for COACHES to be operational in the field, there needs to be a function that allows evacuees to limit the types of relief workers and the types of information they release, as well as a system that allows evacuees to see what information is being shared and for what purpose.

5 Conclusion

In this paper, we used the prototype of COACHES [7] [10] to conduct a preliminary evaluation of information sharing among relief workers from the perspective of evacuees through questionnaires and interviews, and presented the findings from the results. The results showed that while evacuees were less resistance to have their information shared with relief workers, some wanted to limit the type of supporters and type of information shared, with some wanting the minimum type of relief workers who can view the information shared and type of information shared, even if there was no directly identifiable information, such as names and addresses, that could be used to identify individuals.

These results suggest that in order for A to be operational in the field, evacuees need a system to limit the relief worker to share their information and a system to limit the type of information they share. In the future, we aim to clarify which relief workers need which information and to implement a function to restrict information. We will also consider a system that allows evacuees to check what information is being shared and for what purpose. In addition, we plan to conduct a survey of people who have experienced the disaster and healthcare professionals.

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