Effect of large-scale disasters on bystander-initiated cardiopulmonary resuscitation in family-witnessed, friend-witnessed and colleague-witnessed out-of-hospital cardiac arrest: a retrospective analysis of prospectively collected, nationwide, population-based data

ABSTRACT

Importance The effect of large-scale disasters on bystander cardiopulmonary resuscitation (BCPR) performance is unknown.

Objective To investigate whether and how large-scale earthquake and tsunami as well as subsequent nuclear pollution influenced BCPR performance for out-of-hospital cardiac arrest (OHCA) witnessed by family and friends/colleagues.

Design and setting Retrospective analysis of prospectively collected, nationwide, population-based data for OHCA cases.

Participants From the nationwide OHCA registry recorded between 11 March 2010 and 1 March 2013, we extracted 74 684 family-witnessed and friend/colleague-witnessed OHCA cases without prehospital physician involvement.

Exposure Earthquake and tsunamis that were followed by nuclear pollution and largely affected the social life of citizens for at least 24 weeks.

Main outcome and measure Neurologically favourable outcome after 1 month, 1-month survival and BCPR.

Methods We analysed the 4-week average trend of BCPR rates in the years affected and before and after the disaster. We used univariate and multivariate logistic regression analyses to investigate whether these disasters affected BCPR and OHCA results.

Results Multivariable logistic regression for tsunami-affected prefectures revealed that the BCPR rate during the impact phase in 2011 was significantly lower than that in 2010/2012 (42.5% vs 48.2%; adjusted OR; 95% CI 0.82; 0.68 to 0.99). A lower level of bystander compliance with dispatcher-assisted CPR instructions (62.1% vs 69.5%, 0.72; 95% CI 0.57 to 0.92) in the presence of a preserved level of voluntary BCPR performance (23.6% vs 23.8%) was also observed. Both 1-month survival and neurologically favourable outcome rates during the impact phase in 2011 were significantly poorer than those in 2010/2012 (8.5% vs 10.7%, 0.72; 95% CI 0.52 to 0.99, 4.0% vs 5.2%, 0.62; 95% CI 0.38 to 0.98, respectively).

Conclusion and relevance A large-scale disaster with nuclear pollution influences BCPR performance and clinical outcomes of OHCA witnessed by family and friends/colleagues. Basic life-support training leading to voluntary-initiated BCPR might serve as preparedness for disaster and major accidents.

INTRODUCTION

The Great East Japan Earthquake swept the North-East Pacific coast of the Japanese mainland on 11 March 2011, and an earthquake-generated tsunami destroyed cities, towns and villages located at the North-East Pacific coast, resulting in the Fukushima Daiichi nuclear accident. This disaster forced
citizens in afflicted areas to spend a long period as evacuees. A considerable number of major aftershocks with and without a tsunami warning (moment magnitude ≥6.0) occurred for 24 weeks after the main disaster (online supplemental figure, upper panel). After evacuation of survivors living in tsunami-affected areas, more than 15 000 people lived temporarily in ‘shelters’ and eventually moved into temporary housing areas, leaving their hometowns. The search for missing people continued for 24 weeks after the disaster. Based on a survey conducted on 10 June 2020, the final number of victims was 22 167, comprising 19 638 fatalities, which included 3739 disaster-related deaths and 2529 missing people (online supplemental figure, middle panel). Several emergency fire response teams and volunteers provided disaster services in the tsunami-affected prefectures (online supplemental figure, lower panel). Reconstruction of the destroyed towns and cities with resumption of farming and fishery industries began only around 24 weeks after the disaster. Several aspects of this disaster have been reviewed over the past 10 years following the disaster.

Large-scale disasters or catastrophes may psychologically affect the social behaviour of citizens. Disasters are known to temporally increase the incidence of cardiovascular events and other acute illnesses that may lead to out-of-hospital cardiac arrest (OHCA). The outcomes of OHCA depend on dispatcher-assisted and bystander-initiated resuscitation efforts and on initial basic life support (BLS) actions by bystanders who witness OHCA. The Fukushima nuclear pollution disaster and the large-scale pandemic such as COVID-19 may augment the level of general fear of pollution and infection in the population, which might discourage bystander cardiopulmonary resuscitation (BCPR). However, the impact of large-scale disasters on BCPR actions of laypersons is unknown. This study aimed to investigate whether and how the 2011 earthquake influenced the BCPR and outcomes in OHCA cases witnessed by family, friends, and colleagues in the prefectures that were most affected by the earthquake.

METHODS

Data selection and grouping

From the 381 581 nationwide OHCA cases in the All-Japan Utstein-style Registry of the Japanese Fire and Disaster Management Agency, recorded between 11 March 2010 and 10 March 2013, we extracted 108 311 bystander-witnessed cases that did not involve any physician and excluded 2891 cases that lacked information for analysis. After the disaster, many healthcare providers visited the site. Also, there were many healthcare providers in evacuation shelters and temporary housing. Therefore, we extracted 74 684 family-witnessed and friend/colleague-witnessed OHCA cases, excluding cases witnessed by others, to minimise the effect of healthcare providers volunteering for and/or being involved in disaster medical support (figure 1). The study period included the predisaster year 2010 (11 March 2010–10 March 2011), disaster year 2011 (11 March 2011–10 March 2012) and postdisaster year 2012 (11 March 2012–10 March 2013). Tsunami-affected prefectures, defined as prefectures in which a tsunami with a maximum height of >4 m was observed, included five prefectures located in the North-East Pacific coast of the Japanese mainland: Aomori, Iwate, Miyagi, Fukushima and Ibaraki prefectures. The prefectures other than these five tsunami-affected prefectures were designated as other prefectures.

On the basis of the occurrence of aftershocks, number of evacuees in evacuation centres, and resumption of social activities, we determined that 0–23 weeks from 11 March 2011 was the period affected by the disaster. We defined the same period from 2010 to 2012 as the impact phase.

Outcome measures

The primary outcome of this study was provision of BCPR by a family member or a friend/colleague. The secondary outcomes were a neurologically favourable outcome after 1 month, defined as a cerebral performance category score of 1 (good recovery) or 2 (moderate disability) and 1-month survival.

Data analysis

To investigate the validity of the impact phase definition, we analysed the 4-week average trends in the BCPR rate after the day of disaster in the year 2011 and on the same day (11 March) in the predisaster year of 2010 and postdisaster year of 2012 in the tsunami-affected and other prefectures. The influence of disaster on BCPR and OHCA outcomes in the tsunami-affected prefectures were investigated using univariate and multivariable logistic regression analyses. The BCPR rates, 1-month survival rates, and neurologically favourable 1-month outcomes were compared between the disaster year (2011) and the predisaster/postdisaster years (2010/2012) during the impact and the postimpact phases in tsunami-affected and other prefectures.

Bystanders exhibit four patterns of behaviour against OHCA: BCPR following dispatcher-assisted CPR (DA-CPR) instruction, bystander-initiated BCPR without DA-CPR, no BCPR despite DA-CPR and no BCPR without DA-CPR. Furthermore, to clarify the association of the impact phase with dispatcher-assisted and bystander-initiated resuscitation efforts, we calculated the following three indices related to DA-CPR and BCPR in accordance with a previous report: (1) sensitivity of DA-CPR for OHCA (=the number of cases for which DA-CPR was attempted divided by the number of cases that did not receive bystander-initiated BCPR without DA-CPR); (2) proportion of bystanders to follow DA-CPR (=the number of cases that received BCPR following DA-CPR divided by the number of cases for which DA-CPR was attempted) and (3) bystander’s own performance of BCPR for OHCA (=the number of cases that received bystander-initiated...
BCPR without DA-CPR divided by the number of cases for which DA-CPR was not attempted.\(^{10,16}\)

Univariate analyses were performed using the \(\chi^2\) test or Fisher’s exact probability test for nominal variables. Because the continuous variables analysed in this study did not show a normal distribution, the Mann-Whitney U test was applied for continuous variables. Multivariable logistic regression analysis for BCPR provision included the factors, which were well known to be associated with BCPR provision: daytime, weekend, patient sex and age, aetiology of OHCA (presumed cardiac or not, exogenous origin), family bystander and DA-CPR instruction. Factors included in multivariable logistic regression analysis for outcomes were daytime, patient sex and age, presumed cardiac aetiology, initial rhythm (shockable or not), BCPR provision, family bystander, tracheal intubation and epinephrine administration by paramedics, time interval between witness and emergency call, and time interval between emergency call and emergency medical service (EMS) arrival at patients (EMS response time). All tests were two tailed, and we considered a probability \((p)<0.05\) to be statistically significant. All statistical analyses were performed using the JMP Pro V.15 software (SAS Institute).

Patient and public involvement
Patients or the public were not involved in the design, conduct, reporting or dissemination plans of our study.

RESULTS
Number of family-witnessed and friends/colleague-witnessed OHCA cases in the tsunami-affected prefectures and other prefectures
A total of 74 684 family-witnessed and friends/colleague-witnessed OHCA cases were extracted and analysed. Among these, the number of family-witnessed and friends/colleague-witnessed OHCA cases in the tsunami-affected

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**Figure 1** Data selection and subgroup extraction. EMS, emergency medical service; OHCA, out-of-hospital cardiac arrest.
The average rate of BCPR during the impact phase was 42.5% (375/882) for the disaster year 2011 and 0.43 in 2011 and 0.96 in 2010/2012.

Multivariable regression analyses of the differences in BCPR provision and outcomes between the disaster year and the predisaster/postdisaster years

In the tsunami-affected prefectures, the rates of BCPR, 1-month survival and 1-month neurologically favourable outcome in 2011 were significantly lower than those in 2010/2012 during the impact phase. During the postimpact phase, no significant difference in any of these parameters was observed between 2011 and 2010/2012 (table 1).

In other prefectures, significant differences in some prehospital confounders were observed between 2011 and 2010/2012 during the impact and postimpact phases. However, the differences in these parameters were very small (online supplemental table 1).

Analysis of indices for dispatcher-assisted and bystander-initiated resuscitation efforts

In tsunami-affected prefectures, DA-CPR sensitivity and bystander’s compliance to DA-CPR appeared to be suppressed during the impact phase in 2011, being 55.8% and 62.1%, respectively in 2011, and 60.0% and 69.5%, respectively in 2010/2012. However, the difference between 2011 and However, 2010/2012 was significant only for bystander’s compliance to DA-CPR (adjusted OR;
## Table 1  Background, characteristics and time factors of family-witnessed and friend/colleague-witnessed out-of-hospital cardiac arrest cases in tsunami-affected prefectures

| Background, characteristics and time factors | Impact phase | Unadjusted OR (95% CI)* or P value | Postimpact phase | Unadjusted OR (95% CI)* or P value |
|---------------------------------------------|--------------|-----------------------------------|----------------|-----------------------------------|
|                                             | 2011 (N=882) | 2010/2012 (N=1565) | 2011 (N=1179) | 2010/2012 (N=2454) |
| Family-witnessed patients, no (%) | 783 (88.8) | 1404 (89.7) | 0.91(0.70 to 1.18) | 1074 (91.1) | 2219 (90.4) | 1.08(0.85 to 1.38) |
| Daytime (7:00–19:00 hours), no (%) | 520 (59.0) | 950 (60.7) | 0.93(0.79 to 1.10) | 682 (57.9) | 1485 (60.5) | 0.90(0.79 to 1.03) |
| Weekend, no (%) | 141 (16.0) | 192 (12.3) | **1.36(1.08 to 1.72)** | 146 (12.4) | 338 (13.8) | 0.89(0.72 to 1.09) |
| Age, median (IQR), year | 76 (65–84) | 76 (63–84) | 0.12 | 77 (66–84) | 78 (67–85) | 0.17 |
| Male patient, no (%) | 598 (67.8) | 1002 (64.0) | 1.18(1.00 to 1.41) | 734 (62.3) | 1525 (62.1) | 1.01(0.87 to 1.16) |
| Presumed cardiac aetiology, no (%) | 554 (62.8) | 877 (56.0) | **1.33(1.12 to 1.57)** | 725 (61.5) | 1443 (58.8) | 1.12(0.97 to 1.29) |
| Exogenous origin†, no (%) | 102 (11.6) | 206 (13.2) | 0.86(0.67 to 1.11) | 118 (10.0) | 259 (10.6) | 0.94(0.75 to 1.19) |
| Shockable initial rhythm, no (%) | 162 (18.4) | 271 (17.3) | 1.07(0.87 to 1.33) | 185 (15.7) | 345 (14.1) | 1.14(0.94 to 1.38) |
| Dispatcher-assisted CPR, no (%) | 433 (49.1) | 835 (53.4) | **0.84(0.72 to 0.99)** | 598 (50.7) | 1240 (50.5) | 1.01(0.88 to 1.16) |
| Defibrillation by bystanders with an AED, no (%) | 4 (0.5) | 9 (0.6) | 0.79(0.24 to 2.58) | 11 (0.9) | 12 (0.6) | 1.65(0.73 to 3.75) |
| Epinephrine administration by paramedics, no (%) | 153 (17.4) | 256 (16.4) | 1.07(0.86 to 1.34) | 231 (19.6) | 448 (19.7) | 1.00(0.84 to 1.19) |
| Tracheal intubation by paramedics, no (%) | 78 (8.8) | 161 (10.3) | 0.85(0.64 to 1.12) | 103 (8.7) | 251 (10.2) | 0.84(0.66 to 1.07) |
| Time intervals, median (IQR), min | | | | | | |
| Witness-to-emergency call | 2 (0–5) | 2 (0–5) | 0.71 | 2 (0–5) | 2 (0–5) | 0.49 |
| EMS response time‡ | 8 (7–11) | 9 (7–11) | 0.45 | 9 (7–11) | 9 (7–12) | 0.11 |
| EMS arrival at patient-to-arrival at the hospital | 21 (16–28) | 20 (15–27) | <0.05 | 22 (16–29) | 22 (16–29) | 0.74 |

Bold figures indicate significant results.

*2010/2012 as a reference.
†Asphyxia, submersion, hypothermia, poisoning and trauma.
‡Time interval between emergency call and EMS arrival at patient.
AED, automated external defibrillator; CPR, cardiopulmonary resuscitation; EMS, emergency medical service.
95% CI 0.72; 0.57 to 0.92). During the postimpact phase, there were no significant differences in these indices between 2011 and 2010/2012. Difference in the performance of BCPR was detected neither during the impact phase nor during the postimpact phase (table 3).

In other prefectures, none of the three indices differed between 2011 and 2010/2012; neither during the impact phase nor during the postimpact phase (online supplement table 3).

### DISCUSSION

In disaster mental health, the reactions of the community and the individual are usually divided into four phases (heroic phase, honeymoon phase, disillusionment phase and restoration phase), although the duration of these phases may vary depending on the scale and type of disaster. The impact phase in this study covers the period from heroic phase to disillusionment phase. This

| Table 2 | Phasic comparisons of BCPR and outcomes between 2011 and 2010/2012 in tsunami-affected prefectures |
|---------|--------------------------------------------------------------------------------------------------|
| BCPR and outcomes | Impact phase | Adjusted OR (95% CI) with 2010/2012 as a reference | Postimpact phase | Adjusted OR (95% CI) with 2010/2012 as a reference |
| | 2011 (N=882) | 2010/2012 (N=1565) | | 2011 (N=1179) | 2010/2012 (N=2454) |
| BCPR rate, no (%) | 375 (42.5) | 754 (48.2) | 0.82 (0.68 to 0.99)* | 510 (43.3) | 1068 (43.5) | 0.99 (0.84 to 1.16)† |
| 1 month survival, no (%) | 75 (8.5) | 168 (10.7) | 0.72 (0.52 to 0.99)‡ | 103 (8.7) | 200 (8.2) | 1.02 (0.78 to 1.33)§ |
| Neurologically favourable outcome, no (%) | 35 (4.0) | 82 (5.2) | 0.62 (0.38 to 0.98)¶ | 48 (4.1) | 107 (4.4) | 0.89 (0.61 to 1.29)‖ |

**Bold figures indicate significant results**.

*Among the other factors including in the logistic regression model, age (adjusted OR; 95% CI, 0.93; 0.88 to 0.99/10 years), family bystander (0.52; 0.38 to 0.71), and DA-CPR provision (7.07; 5.89 to 8.5) were significantly associated with BCPR rate.
†Among the other factors including in the logistic regression model, age (0.82; 0.87 to 0.97/10 years), family bystander (0.49; 0.37 to 0.64) and DA-CPR provision (9.27; 7.92 to 10.9) were significantly associated with BCPR rate.
‡Among the other factors including in the logistic regression model, age (0.81; 0.75 to 0.88/10 years), EMS response time (0.38; 0.31 to 0.48/10 min), time interval of witness-to-emergency call (0.71; 0.59 to 0.91/10 min), male patients (1.43; 1.01 to 2.03), daytime (7:00–19:00 hours) OHCA (1.54; 1.13 to 2.11), shockable initial rhythm (6.93; 4.92 to 9.76) and epinephrine administration (0.64; 0.41 to 0.99) were significantly associated with 1-month survival.
§Among the other factors including in the logistic regression model, age (0.86; 0.80 to 0.92/10 years), EMS response time (0.46; 0.39 to 0.56/10 min), time interval of witness-to-emergency call (0.66; 0.57 to 0.80/10 min), cardiac aetiology (0.67; 0.50 to 0.89), and shockable initial rhythm (6.93; 4.92 to 9.76) were significantly associated with 1-month survival.
¶Among the other factors including in the logistic regression model, age (0.76; 0.69 to 0.85/10 years), EMS response time (0.29; 0.23 to 0.39/10 min), time interval of witness-to-emergency call (0.54; 0.41 to 0.79/10 min), shockable initial rhythm (12.4; 7.34 to 20.9), and epinephrine administration (0.18; 0.07 to 0.44) were significantly associated with neurologically favourable outcome.
‖Among the other factors including in the logistic regression model, age (0.87; 0.79 to 0.87/10 years), EMS response time (0.39; 0.31 to 0.51/10 min), time interval of witness-to-emergency call (0.53; 0.43 to 0.69/10 min), shockable initial rhythm (12.4; 7.34 to 20.9) and cardiac aetiology (1.53; 1.07 to 2.2) were significantly associated with neurologically favourable outcome.

BCPR, bystander cardiopulmonary resuscitation; DA-CPR, dispatcher-assisted CPR; EMS, emergency medical service.

| Table 3 | Phasic comparisons of indices for dispatcher-assisted and bystander-initiated resuscitation efforts between 2011 and 2010/2012 in tsunami-affected prefectures |
|---------|--------------------------------------------------------------------------------------------------|
| Indices related to DA-CPR and BCPR | Impact phase | Unadjusted OR (95% CI) with 2010/2012 as a reference | Postimpact phase | Unadjusted OR (95% CI) with 2010/2012 as a reference |
| | 2011 | 2010/2012 | 2011 | 2010/2012 |
| DA-CPR sensitivity, no/total (%) | 433/776 (55.8) | 835/1391 (60.0) | 0.84 (0.70 to 1.00) | 598/1062 (56.3) | 1,240/2224 (55.8) | 1.02 (0.88 to 1.19) |
| Bystander's compliance to DA-CPR, no/total (%) | 269/433 (62.1) | 255/835 (69.5) | 0.72 (0.57 to 0.92) | 393/598 (65.7) | 838/1240 (67.6) | 0.92 (0.75 to 1.13) |
| Bystander's own performance of BCPR, no/total (%) | 106/449 (23.6) | 174/730 (23.8) | 0.99 (0.72 to 1.07) | 117/581 (20.1) | 230/1214 (19.0) | 1.08 (0.84 to 1.39) |

**Bold figures indicate significant results**.

BCPR, bystander cardiopulmonary resuscitation; DA-CPR, dispatcher-assisted cardiopulmonary resuscitation.
relatively long impact phase and the wide area affected by the disaster may contribute to the detection of a significant impact of the disaster in this study.

Loss of family members and friends, lack of employment stability, or extensive damage to property, resulting in loss of or a decrease in income are reported as risk factors for the development of disaster-related mental health problems. In this study, the BCPR rate in tsunami-affected prefectures temporarily increased during the 8–11 weeks after the disaster but remained low thereafter, reflecting a temporal relief in anxiety due to increased provision of supplies and accommodation during the “honeymoon phase” and recognition of depressed economic resilience, repeated aftershocks, and escape or avoidance behaviour during disillusionment phase.

The BCPR rate varies between countries, but the BCPR rate in Japan in the 3 years from 2010 to 2012 was as high as or higher than that in the European Union and USA. In comparison with other prefectures, a higher BCPR rate in tsunami-affected prefectures might be due to the higher proportion of citizens having attended BLS training courses every year. People with CPR training are known to perform CPR more than those without an experience of CPR training. Compared with the patients with OHCA in the other (nonaffected) prefectures, those in the tsunami-affected prefectures were subject to relatively higher BCPR rates in the predisaster and postdisaster years, particularly during the spring and summer seasons, which is identical to that in the impact phase that we determined. Major industries in the affected areas included fishery, agriculture, and food processing managed by corporate unions. The population, particularly the elderly, typically endures a rugged winter at home, and their social activities diminish at the end of autumn and over the winter. Meanwhile, during spring and summer, citizens including the elderly cooperate in agricultural work and preparation of social events, including festivals and outdoor events.

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Surveys on citizens and EMS personnel who survived the disaster in tsunami-affected prefectures reported that more than half of them lost their family and friends/colleagues. People who died during the disaster were mostly the elderly (54.4%), suggesting that the proportion of trained bystanders was not affected by the disaster. Thus, decreased rates of BCPR and DA-CPR may be attributed to the decreased collaborative social activities and psychological reactions of dispatchers and bystanders, which may interfere with communication between bystanders and dispatchers.

The 2011 earthquake and the earthquake-associated tsunami were followed by a nuclear accident in the Fukushima prefecture. People who had a false understanding of radiation were afraid to interact with evacuees and avoided contact. For these reasons, it is highly possible that nuclear pollution may interfere with bystander-initiated CPR provision due to augmented fear of nuclear pollution during CPR, particularly of refugees from the polluted area. Recent studies on the COVID-19 pandemic on BCPR support this assumption.

It might be difficult to prevent the BCPR and certain outcomes from deteriorating during the impact phase. The analysis of the three indices related to DA-CPR and BCPR showed that only the level of voluntary performance of BCPR was preserved during the impact phase in tsunami-affected prefectures. Because BLS training is known to augment the willingness to provide voluntary BCPR without DA-CPR, systematic BLS training to citizens may be effective for preservation of voluntary performance of BCPR in the event of a disaster. Furthermore, this study showed that the dependence of outcome on initial shockable rhythm was augmented during the impact phase in Tsunami-affected prefecture. However, incidences of public access to defibrillation (defibrillation by bystanders with an automated external defibrillator, AED) during the study period was extremely low (<1%), particularly during the impact phase in Tsunami-affected prefecture (0.6%). Public-access defibrillation has definitive impact on the outcome of OHCA. Therefore, BLS training including AED use and its supply might function as preparedness for disaster.

**LIMITATION**

This study has several strengths. First, this study focused on alterations in bystander-initiated and dispatcher-instructed BCPR after a large-scale disaster. Second, not only before-and-after comparisons but also differences in trends were analysed between tsunami-affected and tsunami-unaffected prefectures using a large nationwide dataset. However, this study also has several limitations. First, although the catastrophe occurred in the coastal areas of some of the prefectures, the analyses were performed after dividing the prefectures. In tsunami-affected prefectures, no major urban areas were located in the coastal area, and differences in BCPR intervention between urban and rural areas were excluded in this study. Second, bystander-specific data, such as age, sex, and training experience were not included in the database and therefore not available for study. Third, it was not possible to study whether the bystanders were actually psychologically affected. Therefore, these factors potentially associated with BCPR quality might affect the quality of the study results. Fourth, no comparative analysis was performed with the results of other disasters. Fifth, since this study is based on one disaster that occurred in Japan, it is unclear whether the results will apply to other disasters as well. Sixth, as with other observational studies, the validity of data is another potential limitation.
CONCLUSIONS
A large-scale disaster may influence bystander-initiated CPR and outcomes of OHCA witnessed by family/friends/colleagues. BLS training might serve as preparedness for disaster and major accidents.

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TU and KT had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. TU and KT equally contributed to this article as first authors. Guarantor: TU. Study concept and design: TU, KT and HI. Acquisition, analysis and interpretation of data: all authors. Drafting of the manuscript: AH, HM, HI, KT and TU. Critical revision of the manuscript for important intellectual content: TU, HI, KT and YW. Statistical analysis: TU, KT and HI. Administrative, technical, or material support: HI and YW. Study supervision: HI and YW.

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Not applicable.

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This study was approved by the institutional review board of the Ishikawa Medical Control Council and conducted by the study group comprising of members of the Ishikawa Medical Control Council and their collaborators. Patient consent was not required for use of the secondary data.

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Data availability statement
Data sharing not applicable as no datasets generated and/or analysed for this study. No additional data available.

Supplemental material
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