

Diabetes Care Providers' Manual for Disaster Diabetes Care

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ABSTRACT

To ensure that experiences and lessons learned from the unprecedented 2011 Great East Japan Earthquake are used to improve future disaster planning, the Japan Diabetes Society (JDS) launched the “Research and Survey Committee for Establishing Disaster Diabetes Care Systems Based on Relevant Findings from the Great East Japan Earthquake” under the supervision of the Chairman of the JDS. The Committee conducted a questionnaire survey among patients with diabetes, physicians, disaster medical assistance teams (DMATs), nurses, pharmacists, and nutritionists in disaster areas about the events they saw happening, the situations they found difficult to handle, and the needs that they felt required to be met during the 2011 Great East Japan Earthquake. A total of 3,481 completed questionnaires were received. Based on these and other experiences and lessons reported following the 2011 Great East Japan Earthquake and the 2004 Niigata-Chuetsu Earthquakes, the current “Manual for Disaster Diabetes Care” has been developed by the members of the Committee and other invited authors from relevant specialties. To our knowledge, the current Manual is the world's first to focus on emergency diabetes care, with this digest English version translated from the Japanese original. It is sincerely hoped that patients with diabetes and healthcare providers around the world will find this manual helpful in promoting disaster preparedness and implementing disaster relief.

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ROLE OF THE JAPAN DIABETES SOCIETY (JDS) IN DISASTER DIABETES CARE

Following the Great East Japan Earthquake that occurred on March 11, 2011, the Japan Diabetes Society (JDS) immediately launched, in close collaboration with local members of the JDS, consultation services/inquiry counters at key healthcare facilities in the Tohoku region as well as on the JDS website. They provided up-to-date information on local healthcare facilities available for diabetes care. The JDS also called on state and local government agencies to ensure timely delivery of insulin and insulin devices to the disaster areas closed off to traffic, as well as in relaxing the regulations for payment-in-kind for insulin and insulin devices thus delivered; the JDS also sought support from pharmaceutical and medical device manufacturers to ensure adequate/timely supply of insulin and insulin devices¹. All these disaster relief activities were implemented in close collaboration with the Japan Association for Diabetes Education and Care (JADEC).

As part of the Annual Meeting of the JDS held in May 2011 (under the presidency of Masakazu Haneda), two emergency symposia, entitled “Diabetes Care in Disasters and Emergencies”² and “Team Care in Disasters and Emergencies”³, were held to discuss and disseminate emergency diabetes care-related information. Furthermore, the “Research and Survey Committee for Establishing Disaster Diabetes Care Systems Based on Relevant Findings from the Great East Japan Earthquake” (Chair, Jo Satoh, Vice Chair, Koichi Yokono) was launched by the JDS to conduct a questionnaire survey⁴. The responses from this survey identified patients with diabetes as a disaster-vulnerable population. Thus, with the primary focus of the JDS being to maintain the health and save the lives of patients with diabetes through promotion of diabetes-related scientific research and diabetes care, they have defined their role in emergency diabetes care as follows:

1. Promoting disaster preparedness and resilience for diabetes care systems

- The JDS ensures that thorough publicity will be given to the “Manual for Disaster Diabetes Care” in its official publications as well as on its website to promote awareness about the Manual among its members; that the Manual will be reviewed for revision on a regular basis; that the Manual contents will be shared between the JDS, Japan Association for Diabetes Education and Care (JADEC), Japan Medical Association (JMA) and Japanese Council for the Fight against Diabetes (JCFD); and that the Manual will be localized for the JDS chapters and adapted to their local conditions and needs.
- The JDS ensures that emergency diabetes care will become an essential component of its continuing medical education (CME) programs through its Annual Meetings, “Advances in Diabetology” initiatives, and specialty training curricula; and that emergency diabetes care will become part of certification programs for Certified

Diabetes Educator of Japan (CDEJ) in collaboration with the Certification Board for Diabetes Education in Japan.

- The JDS promotes disaster preparedness among patients with diabetes. Through its patient education programs, patients with diabetes will be encouraged to have additional supplies of their insulin formulations, devices for insulin self-injection and self-monitoring of blood glucose (SMBG), and oral hypoglycemic agents, on top of their normal stockpiles and to have with them at all times their Diabetes Coordination Notebook and Drug Profile Book detailing their individual treatment regimens.
 - The JDS promotes disaster preparedness among healthcare facilities by requesting that diabetes-related considerations be added to their disaster preparedness manuals and that insulin formulations and insulin self-injection kits and SMBG device be stockpiled at their facilities in anticipation of disasters.
 - The JDS promotes alignment of local diabetes care networks for insulin supply services/consultation counters in disasters and emergencies in close collaboration with local core diabetes care facilities, board-certified diabetes education facilities, and medical associations.
 - The JDS requests that diabetes medications, such as insulin, be added to the standard medication list for disaster medical assistance teams (DMATs) to make them available for emergency diabetes care. The JDS also ensures in close collaboration with the JADEC and CDEJ that responsibilities are clearly divided and coordinated between diabetes care providers to facilitate timely formation of diabetes medical assistance teams (DiaMATs) as an emergency response.
 - The JDS promotes alignment of emergency contact networks between the JDS headquarters and chapters to facilitate rapid provision of diabetes care in times of disaster.
- ### 2. Facilitating timely provision of diabetes care in times of disaster
- During disasters, the JDS not only launches a task force at the JDS headquarters but ensures that local-level task forces are launched at relevant sites.
 - The JDS ensures close collaboration between the headquarters and local task forces in order to launch consultation services/inquiry counters for insulin therapy, provide information about local healthcare facilities available for diabetes care, and provide assistance to patients with diabetes in medical aid stations (MAS) and evacuation centers.
 - In collaboration with the JADEC, JMA, and JCFD, the JDS ensures that prompt and effective disaster relief activities are implemented to meet the needs of patients with diabetes.
 - The JDS seeks support from insulin formulation and insulin/SMBG device manufacturers in ensuring their supply and delivery to disaster areas.

- The JDS launches a nationwide emergency appeal for help in dispatching diabetes medical assistance teams (DiaMAT) to disaster areas.
- In implementing these disaster relief activities, the JDS closely collaborates with and launches appeals to the state and local governments for support as required.

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Abbreviations

ACS	Acute coronary syndrome
AKI	Acute kidney injury
AP	Angina pectoris
ASD	Acute stress disorder
CCB	Calcium channel blocker
CDEJ	Certified Diabetes Educator of Japan
CF	Cardiac failure
CI	Cerebral infarction
Committee	Research and Survey Committee for Establishing Disaster Diabetes Care Systems Based on Relevant Findings from the Great East Japan Earthquake
CSII	Continuous subcutaneous insulin infusion
CVD	Cardiovascular disease
DiaMAT	Diabetes medical assistance team
DPP-4	Dipeptidyl peptidase-4
DVT	Deep vein thrombosis
EMR	Electronic medical records
GLP-1	Glucagon-like peptide-1
IHD	Ischemic heart disease
IT	Information technology
JMAT	Japan Medical Association team
MAS	Medical aid stations
MI	Myocardial infarction
NVG	Neovascular glaucoma
PD	Panic disorder
PE	Pulmonary embolism
PT-INR	The prothrombin time/international normalized ratio
PTSD	Posttraumatic stress disorder
RAS	The renin-angiotensin system

RD	Retinal detachment
SD	Standard deviation
SGLT2	Sodium glucose co-transporter 2
SNS	Social network services
SUs	Sulfonylureas
TZD	Thiazolidinedione
α -GI	α -glucosidase inhibitor

I. ISSUES IN DISASTER RESPONSES

1. Responding to breakdowns in utilities and communication networks

According to the Committee's survey of physicians working in the disaster areas, the time taken to restore critical utilities (i.e., electricity, water, gas supplies, telecommunications and transportation) differed according to region. In Iwate Prefecture the mean time to restoration of services was three days, with a standard deviation (SD) of seven days. In Miyagi Prefecture the mean and SD time to restoration was 20 and 20 days respectively, while in Fukushima Prefecture it was five and five days, respectively⁴.

1.1. Problems maintaining and restoring utilities

- Power outages led to disruption of electronic medical records (EMR), laboratory tests, food services, nutritional management and information retrieval at affected hospitals, suggesting that hospitals need to have standby generators available.
- Disruption of water supply led to difficulties performing laboratory tests, and providing food/nutritional services at hospitals. In addition, failure of sewage pumps made it impossible to perform urine glucose tests in patients with diabetes. Some survey respondents reported the need to have large water storage tanks or wells to ensure self-supply of water.
- Disruptions to gas supplies resulted in suboptimal provision of food/nutritional services at affected hospitals.
- The earthquake resulted in serious gasoline shortages making it difficult for patients with diabetes to visit hospitals, or for healthcare personnel to commute to and from work and for laboratories to collect specimens for analysis. Therefore, a mechanism is needed for local governments to be able to control the use of available gasoline in emergencies.

1.2. Problems maintaining and restoring communication networks

- Disruption of electricity and telecommunication networks led to difficulties communicating with, and exchanging information between, patients and hospital personnel. Often, portable radios with manual power generating capabilities provided the only source of information.
- Land-line/mobile phones and short message services were often not available.

- Attention needs to be given to ensuring that pre-established means of communication (e.g., satellite telephones, e-mail-based communications networks, ham radio licenses and stations, and social network services [SNS]) are available for use in emergencies.

1.3. Issues in backup of electronic medical records (EMR)

- EMR were not available for use for more than 24 hours after the earthquake in almost half of the hospitals in the coastal areas of Fukushima, Miyagi and Iwate Prefectures.
- Survey results suggested a need for prescription record backup, sharing of medical/nursing care data, digitalization of laboratory test/imaging data for storage in remote places, and installation of rechargeable batteries for computers.

2. Issues in food/medication storage and stockpiling

Some victims of the Great Hanshin-Awaji Earthquake reported having no access to disaster relief, such as emergency food or water supply, for more than 1 week⁵. In the Great East Japan Earthquake, some communities in the hard-hit Sanriku coast were isolated for more than 2 weeks.

2.1. Emergency food storage and stockpiling

- Storing a 3-day supply of food is considered common practice among general households.
- However, clinics and hospitals also need to ensure there is enough emergency food to provide for incoming refugees.
- Hospitals located in coastal areas also need to consider the potential impact of a tsunami when ensuring a supply of emergency food.

2.2. Issues in stockpiling medications and laboratory test agents

- Insulin therapy is essential to the survival of patients with type 1 diabetes.
- According to the report of Nakahara *et al.*⁶, 85% of patients with type 1 diabetes had stockpiled 71 days' worth of insulin for emergency use. In contrast, 24% of those using disposable insulin formulations had no emergency stockpiles.
- Before the Great East Japan Earthquake, about half of the healthcare facilities in the disaster areas had emergency drug supply measures in place in collaboration with local medical/pharmacist associations and local governments. The most common problems encountered in post-emergency diabetes care were drug shortages, difficulties accessing laboratory tests, and inadequate supplies of self-monitoring blood glucose (SMBG) devices.
- As part of patient education, patients with diabetes should be instructed to stockpile their oral hypoglycemic agents, insulin and devices for insulin self-injection.
- Patients with diabetes also need to be instructed to keep their Diabetes Coordination Notebook and Drug Profile Books, detailing their individual treatment regimens with

them at all times. It is also advisable to instruct them to photograph their latest prescription forms using their mobile phones and have this digitally stored.

3. Disaster response and training manuals for healthcare facilities

3.1. Considerations in the development and revision of disaster response manuals for healthcare facilities

- Healthcare facilities should develop their own manuals with regular review and revision. If they are found to be too bulky for ready use, simplified versions outlining minimum instructions for disaster response should also be developed.

3.2. Building familiarity with disaster manuals and implementation of disaster preparedness training among healthcare personnel

- All healthcare personnel need to be sufficiently familiar with their disaster manuals.
- Disaster preparedness training should be implemented regularly, with the dates for the training predetermined for each year.

3.3. Using disaster response manuals for healthcare facilities to promote local disaster preparedness

3.3.1. Safety assessment for healthcare facilities against disasters

- Personnel at each healthcare facility should ensure that their facility meets all necessary requirements for the safety of their patients and local residents in times of disaster.
- Personnel at each healthcare facility should implement measures to prevent the medical equipment/facilities, bookshelves, and file cabinets from toppling over in times of disaster.
- Personnel at each healthcare facility should ensure that critical utilities, such as water, gas, electricity and emergency fuels, will continue to be supplied during disasters.
- Personnel at healthcare facilities situated near water (sea, lakes, rivers) should ensure that disaster response measures are in place against potential tsunami or flood hazards.

3.3.2. Emergency task force headquarters

- Local task force headquarters consisting of superintendents or other personnel from local healthcare facilities should be set up as central command centers for gathering and sorting relevant disaster-/disaster relief-related information and coordinating activities.

3.3.3. Emergency communications networks

- Care should be taken to ensure that emergency communication networks are in place among disaster-relief personnel (physicians, senior or higher-level staff members, disaster managers, energy/infrastructure managers [e.g., boilers, electric power sources] at each facility.

- Given that land-line and mobile telecommunications are less likely to be readily available in times of disaster, priority call numbers should be shared for emergency use among healthcare personnel.
- It is also advisable to have satellite phones or portable wireless devices ready for emergency use.

3.3.4. Healthcare personnel mobilization

- Healthcare personnel should voluntarily make themselves available for disaster relief in case of a major earthquake, magnitude 5 or higher. It is essential for all personnel to know in advance who is likely to be available within 60 minute-walk following a disaster.
- Pre-disaster planning should determine who will be in charge of each specific task at the task force headquarters.

3.3.5. Emergency food, drinking water and medication stockpiling

- Each healthcare facility should ensure that sufficient emergency food, drinking water and medications are stockpiled, maintained and ready for distribution, not only for inpatients and healthcare personnel, but for nearby local residents.
- All diabetes medications and devices likely to be required in an emergency, such as insulin and oral hypoglycemic agents should be stockpiled and maintained.

3.3.6. Patient education

- All patients with diabetes treated at healthcare facilities should be individually instructed on how to deal with “sick day” in an emergency situation.
- Patients with diabetes should be instructed to enter all their prescriptions and laboratory data in their Diabetes Coordination Notebook and Drug Profile Book and to carry these at all times.
- All patients should be instructed on how to be contacted through diabetic patient groups or networks in case of emergency.

3.4. Emergency/disaster manual implementation

- In case of major earthquakes, magnitude 5 or greater, the emergency/disaster manual should be automatically implemented at affected facilities even without notice from the authorities, and each personnel member should voluntarily take action according to the manual.

3.4.1. As a first step, personnel should check to see whether any personnel, patients or facility employees have been injured;

3.4.2. Personnel should then identify any fire hazards, and put out any fires that may have started, followed by conducting an

assessment of critical utilities as part of an initial disaster response;

3.4.3. Subsequently, each personnel member should perform his/her predetermined role in disaster relief flexibly, either at their discretion or according to directions given by those in charge of disaster relief activities. In addition, to avoid overworking, it is important that replacement personnel are available to provide relief as required, and that information is shared both between personnel and task force headquarters

4. Local healthcare collaboration and alignment

- Local healthcare collaboration is a prerequisite for promoting disaster preparedness, e.g., emergency medical stockpiling, medical information sharing, and local backup networking with core facilities.
- Promoting local disaster preparedness requires local governments to carry out simulation studies to identify optimal delivery routes for disaster relief goods. These studies should involve local medical/pharmacist associations, pharmaceutical wholesalers, and the Japan Hygiene Products Industry Association.
- After the Great East Japan Earthquake, it was recognized that there is a need to establish a medical information backup system drawing on advanced information technology (IT), such as cloud computing. An example of this is a local government-led medical and welfare information network system currently being built in Miyagi Prefecture, with increasing commercial ramifications.
- One notable feature of disaster relief in the Great East Japan Earthquake was the failure of core hospitals in disaster areas to fulfill their disaster relief functions due to the large-scale tsunami damage that followed. This has shown the need for more disaster-resilient facilities be established in these areas.
- Preserving hospital functions at local core hospitals against large-scale disasters requires buildings and facilities be earthquake-resistant; that emergency water storage tanks, off-grid generators and enhanced fuel tanks are installed; and that clinics and core hospitals are effectively aligned in disaster relief through routine close collaboration.

II. ROLE OF DIABETES CARE PROVIDERS IN DISASTERS AND EMERGENCIES

1. Disaster medical assistance teams (DMATs)

- DMATs were launched in conjunction with the 1995 Great Hanshin-Awaji Earthquake as a disaster relief measure against “avoidable accidental deaths”, with each representing a mobile, well-trained, medical team that can be made available for disaster relief in the acute phase.
- DMATs comprise 1 physician, 2 nurses, and 1 operational coordinator. All DMATs (each organized around 1 emergency physician or surgical clinician) are mobilized from all parts of Japan at the request of local and/or central

governments to implement acute-phase disaster relief within 48 hours of the disaster.

- Mobilized for disaster relief immediately after disasters occurring in localized zones, such as the 2004 Niigata-Chuetsu Earthquakes, DMATs were found highly mobile/functional and useful not only in providing rapid, on-the-spot management of sick and injured citizens but also in transferring seriously injured victims by physician-staffed helicopters or ambulances to the local disaster relief healthcare facilities.
- In the Great East Japan Earthquake, which affected an extremely wide area and triggered devastating tsunami disasters, DMATs were deployed to the disaster sites but their mobilization revealed new challenges in a disaster of this scale. These challenges included “less need for critical care”, “pervasive communication problems”, and “suboptimal performance of the local task force headquarters in coordinating disaster responses”⁷.
- DMATs were equipped with emergency medication kits including antibiotics for disaster relief in the Great East Japan Earthquake. However, the medications required differed, with a high demand for antihypertensive agents, antidiabetic agents, and anticoagulants.

2. Diabetes medical assistance teams (DiaMATs)

- DMATs are primarily intended to address medical emergencies, such as traumatic injuries, burns, fractures, massive bleeding, and crush syndrome. However, providing for disaster diabetes assistance involves a wide range of considerations, which include not only ensuring insulin supplies for patients with type 1 diabetes and treating hypoglycemia/hyperglycemia in the ultra-acute/acute phase but dealing with patients with diabetes discontinuing treatments, providing patient education as required, and providing care for diabetic complications in the subacute/chronic phase. To address this, specialized diabetes care teams needed to be organized as part of disaster relief not only to provide logistic support for DMATs, Japan Red Cross, and Japan Medical Association teams (JMATs) in the ultra-acute/acute phase but to provide disaster deployment/diabetes care assistance in the sub-acute/chronic phase.
- At present, represented mainly by JDS members from university hospitals and core regional hospitals in the areas affected by the 2011 Great East Japan Earthquake and the 2016 Kumamoto Earthquakes, the JDS has set up the “Preparatory Council for Disaster Diabetes Medical Assistance” to develop diabetes medical assistance teams (DiaMATs) which will mobilize at the request of government agencies. Their role is to provide disaster deployment/medical assistance by forging a collaborative alliance between government agencies, the JDS, Japan Association for Diabetes Education and Care (JADEC), Certified Diabetes Educators of Japan (CDEJs), and local diabetes educators.

- The DiaMAT secretariat is to be launched not only at the prefectural level within each prefectural chapter of the JDS, but at the regional level as part of each regional chapter of the JDS. Members of the JDS and JADEC are to play a pivotal role in DiaMAT activities in close collaboration with CDEJs and local/regional diabetes educators.
- The Preparatory Council for Disaster Diabetes Medical Assistance is to work closely with relevant prefectural/local government agencies, local medical associations and core hospitals in planning disaster preparedness, fostering and educating DiaMATs, conducting emergency drills, and keeping track of patients with type 1 diabetes' whereabouts.
- In case of disaster, the DiaMAT secretariat is to deploy DiaMATs at the request of the local government agency or based on the available disaster information.
- The DiaMAT secretariat is to arrange for DiaMATs to be deployed according to the following rating scale: 1., a disaster for which deployment of DiaMATs available in the disaster area alone may be sufficient to provide required disaster medical assistance; 2., one for which deployment of DiaMATs from neighboring/other prefectures may be required to provide disaster medical assistance; and 3., one which may require long-term disaster relief involving assistance/deployment of DiaMATs from all parts of the country.

3. Physicians

3.1. Role of physicians as supervisors of team care

- Diabetes care requires multidisciplinary instructions. Thus, patient-centered diabetes care can only be made by a team that draws on the expertise of personnel from a wide range of specialties and for which a physician is ultimately held responsible.
- Members of each team should work closely together, sharing information of interest and achieving consensus on how to provide emergency diabetes care.

3.2. Disease severity in disaster victims with diabetes and triage principles

3.2.1. Acute phase (within 1 week after the disaster): Highest priority

- Insulin-dependent refugee patients who may be at risk of dying of ketosis and other conditions without basal insulin replacement, even when not eating as usual.
 - Physicians should look for patients whose medical records show they are receiving insulin therapy.
 - Physicians should confirm with these patients or their family if they have type 1 diabetes and treat those confirmed to have received 4 insulin injections a day.
- Patients with ketosis
 - Physicians should measure blood glucose in patients with ketosis using a glucose monitor and examine ketone

levels in hyperglycemic patients using urine testing strips to avoid missing potential ketosis.

- Patients with hypoglycemia

- First, physicians should examine patients with hypoglycemia for symptoms of sympathetic nerve stimulation, such as sweating, anxiety, palpitation, tachycardia, tremor of the extremities, and facial pallor, as well as for central nervous system-related symptoms, such as headache, blurred vision, and sleepiness.
- Second, physicians should measure glucose levels using a glucose monitor, taking into consideration that hypoglycemia may occur in patients with diabetes whose dietary intake is compromised during their prolonged life as evacuees.
- Physicians should exercise caution when interpreting abnormal behavior in elderly patients, with symptoms of hypoglycemia easily mistaken for dementia.

3.2.2. Sub-acute phase (from post-disaster week 2 to post-disaster month 1 or 2)

- First, physicians should examine disaster victims with diabetes for signs of deteriorating glycemic control and return them, step by step, to their original regimens (insulin/oral hypoglycemic agents) and doses.
- Second, physicians should examine them for high blood pressure, given that salty foods tend to be served at refugee camps/shelters.

3.2.3. Chronic phase (from post-disaster month 2 or 3 onwards)

- First, physicians should examine disaster victims with diabetes for glycemic control based on their HbA1c levels, blood pressure, and lipid control and review their diet therapy/pharmacological regimens for possible revision. Physicians should also look for potential complications based on ischemic changes (e.g., painless myocardial infarction) on electrocardiography, microalbuminuria, and ocular changes in these patients.
- Last but not least, physicians should look out for and manage clinical depression, which tends to be associated with, and worsens, diabetes.

4. Nurses/public health nurses

Nurses, who work at close quarters with patients in clinical settings, have a large role to play in diabetes disaster teams.

4.1. Assessment of patient's situation/condition in times of disaster

4.1.1. Acute phase (from immediately post-disaster to post-disaster week 1)

- Nurses should examine what type of disease each refugee has (type 1, type 2 or any other form of diabetes); whether or not they are using insulin injections (types and units used)/how

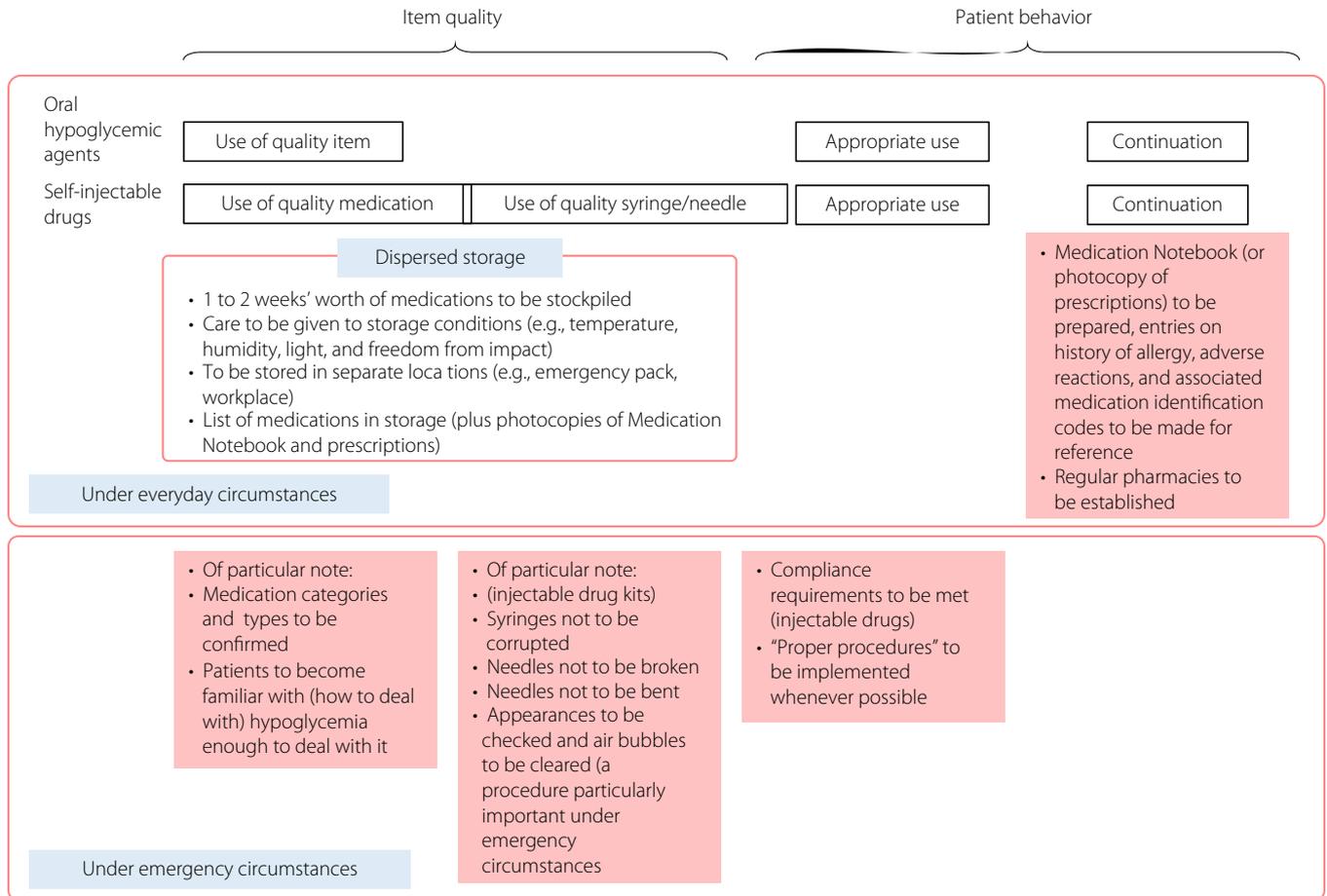


Figure 1 | Points in medication instruction: role of pharmacists in routine clinical settings (upper portion) and role of pharmacists in times of disaster (lower portion).

many insulin doses remain unused; and whether or not they have performed SMBG/how many SMBG kits remain unused. They should also measure glucose levels and look for symptoms of hypoglycemia or hyperglycemia as well as for wounds. Finally, nurses should also find out where they are taking shelter and assess their dietary intake as refugees.

- Some patients think they should take second place to others who have more serious disease or prefer not to let their neighbors or acquaintances know that they have diabetes and particularly that they are self-administering insulin. Therefore, nurses should exercise utmost caution in gathering information from patients.

4.1.2. Sub-acute phase (from post-disaster week 2 to post-disaster month 1 or 2)

- Nurses should examine each refugee’s glucose/HbA1c level; whether or not they are using insulin injections/how many insulin doses remain unused; and whether or not they are using pharmacological agents/how many medications remain unused. Nurses should also

find out about their diabetic complications, living conditions, and mental status.

- After a disaster, the time taken before patients with diabetes restart diet therapy, exercise therapy, oral hypoglycemic therapy, insulin therapy, and SMBG was previously reported to be, on average, 22.1, 26.1, 8.6, 7.8, and 13.2 days, respectively⁴.
- Disaster victims with diabetes may try to resume their pharmacotherapy relatively early, e.g., within a week of the disaster. In contrast, they may find diet/exercise therapy more difficult to resume, depending on the situation in their refugee camps/shelters.
- The eating patterns of diabetic disaster victims may change due to stress, ranging from anorexia through to overeating.

4.1.3. Recovery/restoration phase (from post-disaster month 1 or 2 onwards)

- Nurses should measure glucose/HbA1c levels in patients with diabetes and find out about their diabetic complications,

treatment status, body weight changes, living conditions, mental status, and means of transportation required for their hospital visits.

- Nurses should bear in mind that changes in living conditions, such as temporary housing, and difficulties in gaining access to appropriate/desirable foodstuffs as well as in implementing exercise therapy in public may pose new challenges in diabetes self-care.

5. Pharmacists

5.1. Role of pharmacists in routine clinical settings (see Figure 1; upper portion)

- The surveys conducted following the Great East Japan Earthquake show that those who had their medications/ Drug Profile Book with them accounted for the largest proportion of all patients with diabetes being dealt with by pharmacists after the disaster. Therefore, pharmacists should instruct patients with diabetes to carry with their Drug Profile Book or a photocopy of their prescriptions at all times⁴.
- It took 2 to 4 weeks for antidiabetic drug supplies to be restored to normal, i.e., to their level before the Great East Japan Earthquake⁴. Therefore, pharmacists should instruct

patients with diabetes to stockpile at least 1 to 2 weeks' worth of medications in different locations against disasters.

5.2. Role of pharmacists in times of disaster (see Figure 1; lower portion)

- Pharmacists should confirm that diabetic disaster victims have exactly the same medications they are currently using and confirm that there is no problem with the medications.
- Pharmacists should also instruct patients on how to adhere to their prescribed regimens as best as possible, as well as on how to store their medications to maintain their quality. Pharmacists should also confirm whether they have carbohydrates ready for hypoglycemic episodes.
- Pharmacists should exercise care in ensuring that insulin injections are not interrupted in those found to be highly insulin-dependent and that diabetic disaster victims are not discouraged from reusing insulin syringe needles when they are in short supply. Pharmacists should ensure that, when storing insulin cartridges, they are not fitted with syringe needles. This is because storing insulin cartridges fitted with syringe needles may lead to leakage of the medication or formation of air bubbles in the cartridges with changes in temperature⁸. Pharmacists should also instruct diabetic disaster victims to keep blood sampling sites for SMBG and puncture sites for insulin self-injection clean.

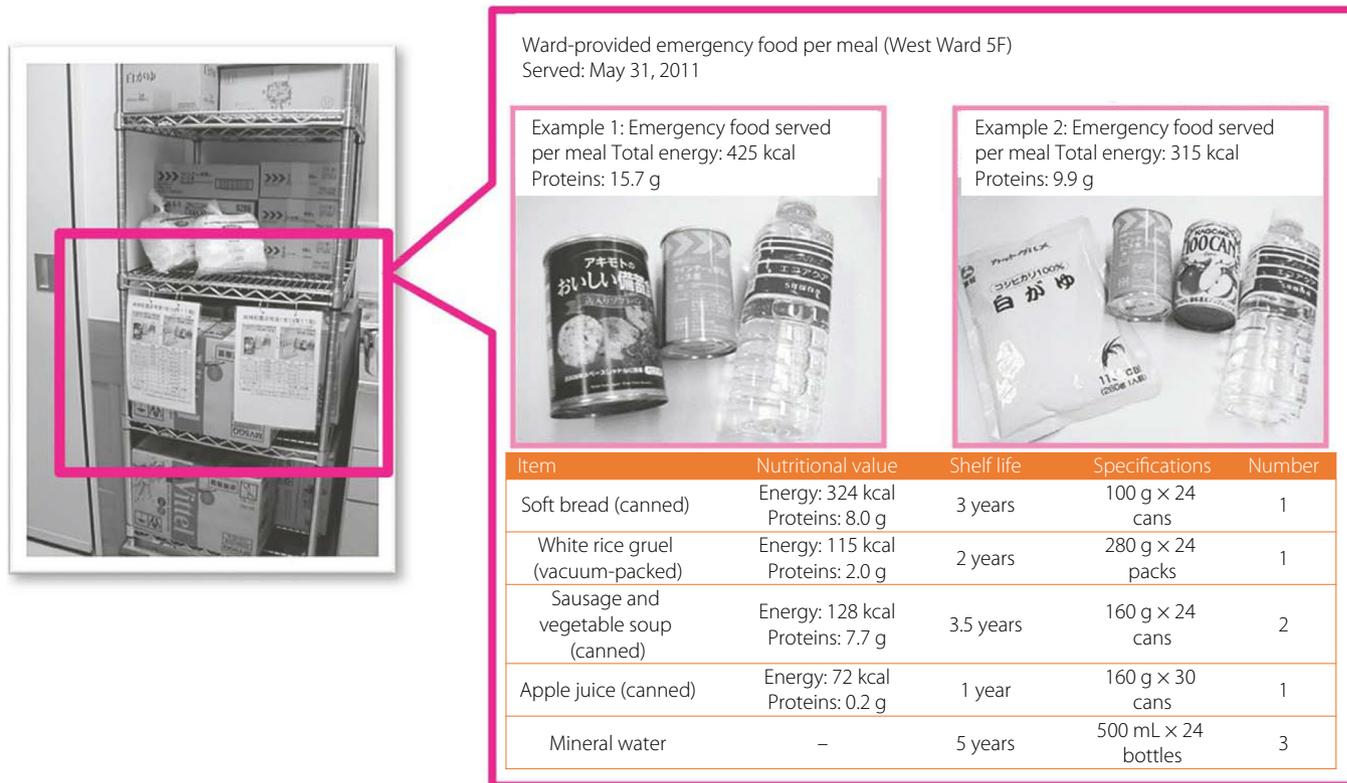


Figure 2 | Ward-provided emergency food: calorie labeling is given to help disaster victims with diabetes on insulin or oral hypoglycemic agents to adjust their medication doses.

- Pharmacists should also instruct patients with diabetes to store injectable formulations in a dark space away from heat, to prevent them from becoming frozen, and to check that the cartridges or vials in stock contain no foreign material or show no signs of discoloration⁹.

6. Managerial dietitians

6.1. Emergency food stockpiling and storage space considerations

- Managerial dietitians should ensure that 3 days' worth of food is stockpiled for emergency use at their facilities, based on the amount previously recommended: "about 3 days' worth of food, drinking water and medications required to last until their supplies are appropriately resumed".
- It may also be advisable to stockpile 1 meal's worth of food per person around pantries in multitier wards housing numerous inpatients. This is in case of disruptions to elevators during power outages, making it difficult to evacuate patients.

6.2. Requirements for emergency food

- It can be eaten unheated.
- Calorie labeling is given to help disaster victims with diabetes on insulin or oral hypoglycemic agents to adjust their medication doses (see Figure 2).
- During the first few days after a disaster, rice or bread-based meals may be the most commonly available to diabetic disaster victims, often without accompanying side dishes thus leading to loss of appetite. Therefore, furikake (seasoned dry power sprinkles) or tsukudani (food boiled in soy sauce) may be a welcome addition to emergency relief goods. It may also be helpful to stockpile vitamin and mineral supplements, as long-term provision of emergency food can be associated with serious vitamin/mineral deficiencies.

6.3 Water stockpiling for emergencies

- Water should be stockpiled not only for drinking but for cooking. It may be advisable to examine in advance how much water may be needed per day for cooking.

7. Exercise therapists/physiotherapists

- It may be difficult during disasters and emergencies in which people are forced to live in refugee camps/shelters for extended periods of time for them to exercise. Therefore, deep vein thrombosis (DVT) and disuse syndrome are of particular interest to exercise therapists/physiotherapists.
- Exercise therapists/physiotherapists should bear in mind that frequent hydration, calf muscle stretches and self-massages are shown to be useful in preventing DVT.
- Exercise therapists/physiotherapists should also note that simple resistance exercises are shown to be useful in preventing disuse syndrome.

8. Laboratory technicians/clinical engineers

- Clinical laboratory tests are the key to diabetes care, resulting in diabetes being termed a "test-ridden disease". Therefore, in large-scale disasters such as the Great East Japan Earthquake, where it is difficult for required tests to be readily available (e.g., glucose/HbA1c data), every effort should be made to restore laboratory test facilities in disaster areas as soon as possible.
- When questioned if they had SGMB, glucose sensors, puncture needles ready for emergency evacuation at the time of the Great East Japan Earthquake, 41.3% of patients reported having a sufficient amount, 23.5% a moderate amount, 14.5% insufficient amount and 20.8% reported having none available. Approximately one-third of patients were found to have been poorly prepared for the disaster⁴.
- The Great East Japan Earthquake led to disruption of laboratory operations at many facilities.
- The Japanese Society of Laboratory Medicine launched the "Great East Japan Earthquake Task Force Committee" to ensure supplies to disaster sites of laboratory test equipment and test reagents which required no water to work.
- Having previously experienced the 1995 Great Hanshin-Awaji Earthquake and thus highly aware of the need for assistance with clinical laboratory testing in times of disaster, the Hyogo Association of Medical Technologists provided physical support over a 2-month period after the Great East Japan Earthquake.

9. Dentists/dental hygienists

- The Great East Japan Earthquake caused damage to both the water supply and sewage systems in the disaster areas, making it difficult to ensure sufficient supplies of daily water other than those for drinking purposes. As a result, insufficient mouth cleansing not only compromised dental health (thus accounting in part for an increase in the incidence of aspiration pneumonia) but increased plaque deposits leading to the onset/progression of periodontal disease in the disaster areas.
- Worsening of advanced periodontal disease is known not only to induce acute inflammation, such as development of abscesses, but to increase tooth mobility and tooth loss. Therefore, dentists/dental hygienists should instruct diabetic disaster victims with on the importance of mouth cleansing through on-site instructions and ensure that their dental care habits are maintained. They should implement professional plaque control measures at mobile or temporary clinics.
- There is a sizable subpopulation of patients with diabetes with dentures who require special care including denture cleaning. In refugee camps/shelters, denture cleaning should be addressed as an important issue, given that it tends to be inadequate not only due to water scarcity but also due to the psychological impact of group living. Again, ensuring supplies of dental/denture care goods to disaster victims with diabetes, as

well as means of delivery of these goods, is an important challenge to be addressed in emergency diabetes care.

III. INDIVIDUALIZED EMERGENCY RESPONSES TO DIFFERENT FORMS OF DIABETES AND THERAPIES

1. General considerations

1.1. Goals of emergency diabetes care

- One of the most important aspects of diabetes care in a disaster/emergency, particularly in its sub-acute phase, is how to eliminate the need for diabetes-related emergency care or transportation services.
- Therefore, diabetes care should focus on preventing diabetic coma associated with hypoglycemia or hyperglycemia, which may result from dietary changes due to disruption of critical utilities/logistics and from shortages of medications including insulin, as well as to prevent infectious diseases and dehydration in patients with diabetes.
- Rather than aiming for HbA1c less than 7% with highly potent antidiabetic drugs, the DiaMAT personnel should choose medications less likely to be associated with hypoglycemia even in patients with relatively high glucose levels. Highly potent agents should be replaced or their doses adjusted according to dietary intake, which may vary depending on the daily food supply.
- The DiaMAT has an important role to play in preventing persistent hyperglycemia in patients with diabetes, thereby reducing their risk of infectious diseases, such as pneumonia, which are associated with poor hygiene or compromised immunity found under emergency circumstances.

1.2. On-site diabetes care in refugee camps/shelters

- It should be borne in mind that blood glucose levels are likely to be unstable in times of disaster. This is due to factors contributing to increased glucose levels in diabetic disaster victims, such as high-carbohydrate diets, decreased physical activity, increased stress and shortages of antidiabetic medications, as well as factors contributing to decreased glucose levels, such as food shortages and increased physical activity in some patients.
- It should also be kept in mind that disaster victims with diabetes may find it difficult to adhere to their dietary therapy, with the most commonly available food usually high in carbohydrates and ill-balanced, thus accounting for marked increases in postprandial glucose levels.
- While antidiabetic medications or insulin may often be initiated or changed in diabetic disaster victims to address their postprandial hyperglycemia, this may induce fasting hypoglycemia in these patients. Furthermore, during post-disaster periods associated with electric power instability, meals may be served twice a day, often at 10:00 and 16:00. In this situation, patients with diabetes may remain fasting longer than usual and need to be monitored for hypoglycemic episodes.

- Diabetic disaster victims should be encouraged to drink water often, as insufficient water intake not only leads to constipation or dehydration but increases the risk of hyperglycemic hyperosmolar syndrome in elderly patients. Thus, except for those instructed to restrict water intake by their physicians, diabetic disaster victims should be encouraged to drink as much fluid, mainly water or green tea, as possible.

1.3. Points to remember in providing diabetes care

- Drug Profile Books are useful in dealing with patients with diabetes who have difficulty remembering the names of their medications/insulin formulations. Therefore, care should be taken to ensure that patients with diabetes recognize their importance and carry them at all times.
- There was a shortage of SMBG kits at refugee camps/shelters in the acute phase following the Great East Japan Earthquake.
- Patients with diabetes should be regularly instructed on how to adjust their medications under emergency circumstances where their food intake may be inadequate or inappropriate, as well as on how the sick-day rules may also apply in times of disaster.
- Care should also be taken to ensure that patients with diabetes have a sufficient amount of glucose ready to carry around at all times for use against hypoglycemic episodes. Given the difficulties in securing water or paper cups under emergency circumstances, patients may find glucose gels or cubes more convenient than glucose powders.

2. Insulin therapy

- Patients with diabetes should continue with their insulin therapy even under emergency circumstances, while at the same time responding to day-to-day changes in their dietary intake.
- Patients with diabetes should not discontinue their insulin therapy based on their own judgment even under circumstances where their dietary intake may remain unstable.
- Patients with diabetes who perform SMBG should continue with SMBG as best as they can, adjusting their insulin doses based on their measured glucose values.
- Under emergency circumstances, where insulin kits may be found in short supply, it may be necessary for patients with diabetes to reuse insulin syringe needles rather than dispose of them after use, taking care not to damage them. In this case, care should be taken to remove air bubbles first by tapping the syringe, pushing up the plunger and pushing out the air.
- When alcohol swabs are in short supply, patients with diabetes may be required to omit injection site cleanups before injections.
- Syringes and needles should only be used in the same patient.

- Diabetes care providers should exercise discretion in ensuring that disaster victims with diabetes continue with their insulin therapy, given that many may be reluctant to self-inject insulin in public.
- Under emergency circumstances that make it difficult to store insulin in a dark, cool space, insulin may be stored at room temperature for at least 4 weeks during which it is expected to remain viable, with care being given to avoiding heating and freezing insulin.
- For diabetic disaster victims having difficulty remembering the names of their staple insulin formulations, insulin brochures featuring photographs of insulin formulations should be used, as this will often help them visually recognize their formulations.
- Ultra-rapid-acting insulin formulations are the most convenient of all insulin formulations available and can be made available for use in diabetic disaster victims who may often be given high-glucose/high-carbohydrate meals. Indeed, JDS-initiated surveys revealed that ultra-rapid-acting insulin formulations were the most frequently used of all insulin formulations after the Great East Japan Earthquake.

2.1. Precautions for use of insulin in patients with type 1 diabetes

- Insulin injections should never be interrupted as their interruption for as short as 1 day may be associated with the risk of ketoacidosis.
- Diabetic disaster victims should continue with their basal insulin (i.e., long-acting or intermediate-acting insulin) at a similar dose to that used under everyday circumstances, even under emergency circumstances where they may be unable to have appropriate meals.
- Patients with diabetes should be given bolus insulin (ultra-rapid-acting or rapid-acting insulin) depending on their dietary intake. Bolus insulin is considered safer when given after meals in those whose meal times or volumes are less likely to be predicted.
- Continuous subcutaneous insulin infusion (CSII):
 - Even under emergency circumstances, if insulin pumps are found intact and insulin and insulin-related equipment in stock, CSII should be continued as usual. As a rule, it is considered safer to give basal insulin at a similar dose to that used under everyday circumstances and to give bolus insulin after meals with its dose adjusted to dietary intake.
 - Given the anticipated difficulties in securing supplies of disposables and problems with insulin pumps, insulin pens should be stockpiled to allow patients with diabetes to switch to frequent insulin injection therapy as required.
- Healthcare personnel at each facility should be notified of the contact addresses of all type 1 patients with diabetes

Table 1 | Dose adjustments for oral hypoglycemic agents under emergency circumstances

	Insulin secretagogues (SUs, glinides)	α-glucosidase inhibitors	Biguanides	Thiazolidinediones	DPP-4 inhibitors
Dose adjustment under emergency circumstances	Dose should be reduced to 1/2 in those with 1/2 their normal dietary intake; drug should be discontinued in those with < 1/3 their normal dietary intake	Drug may be discontinued in those with abdominal symptoms	Drug may be discontinued in those thought likely to be at risk of dehydration due to diarrhea or fever	Drug may be discontinued in those presenting with edema	No dose adjustment required in some DPP-4 inhibitors
Adverse reactions thought likely to occur in times of disaster	Hypoglycemia	Gastrointestinal symptoms	Lactic acidosis due to dehydration Gastrointestinal symptoms	Edema Cardiac failure	Potential hypoglycemia depending on drug used in combination

being treated there, so that they may be able to keep track of their insulin supplies in case of emergency.

- The concept of allied carbohydrate counting for patients with diabetes will prove useful in treating those whose dietary intake may vary widely and who require dose adjustments for their ultra-rapid-acting insulin.

2.2. Precautions for use of insulin in patients with type 2 diabetes

- It should be borne in mind that patients with diabetes receiving insulin therapy include some patients with type 2 diabetes whose insulin-secretory capacity is impaired and whose insulin therapy should not be replaced with oral hypoglycemic agents without prior careful consideration.
- Twice-daily mixed insulin formulations may not be readily available for use in some patients with an irregular eating pattern. During periods when meal times and volumes may vary widely among patients with diabetes or when they may be frequently associated with hypoglycemic episodes, switching from twice-daily mixed insulin to frequent insulin injection therapy or once-daily long-acting insulin therapy combined with a glinide or a DPP-4 inhibitor may allow for more flexibility.

3. GLP-1 receptor agonist therapy

- Given that GLP-1 receptor agonists are less likely to be associated with hypoglycemia and do not require dose adjustments even in patients with an irregular eating habit/pattern, they may be included among the medications designated for emergency use.
- Current GLP-1 receptor agonists have the advantage of requiring very few injections and promise to become viable emergency options in diabetes treatment, with the accumulation of clinical experience with these agents over time.

4. Oral hypoglycemic therapy

- It is a matter of concern that diabetic disaster victims treated with oral hypoglycemic agents alone may be more susceptible to hypoglycemia than to hyperglycemia, reflecting the efficacy of these agents relative to the patients' irregular dietary intake and poor health due to the adverse effects of these agents. Thus, care should be taken to choose oral hypoglycemic agents that are less likely to be associated with hypoglycemia or adverse events, with attention also given to hyperglycemia associated with the interruption of these agents and intake of high-carbohydrate meals (Table 1).

4.1. Sulfonylureas (SUs)

- Sulfonylureas (SUs) provide reliable glucose lowering. One of the antidiabetic drug classes most commonly used by non-diabetologists and by an extremely large

population of patients, SUs are also commonly used under emergency circumstances. Indeed, the JDS-initiated surveys on the Great East Japan Earthquake revealed that SUs were among the oral hypoglycemic agents most frequently brought in by the disaster relief teams to disaster sites.

- Given that SUs possess potent insulin-secretory properties with long-lasting efficacy, they are highly likely to be associated with hypoglycemia. Furthermore, given that hypoglycemic episodes are last for prolonged periods of time with SUs, it is safer to reduce their doses in elderly patients, those receiving high-dose SUs or those whose meal intake may be too unstable to be predicted.

4.2. Rapid-acting insulin secretagogues (glinides)

- Rapid-acting insulin secretagogues (glinides) are suitable for correcting postprandial hyperglycemia and represent a viable option for use not only in disaster victims with diabetes who tend to be given high-carbohydrate meals but also in those with an irregular eating habit/pattern.

4.3. α -glucosidase inhibitors (α -GIs)

- α -glucosidase inhibitors (α -GIs) are associated with a range of gastrointestinal symptoms. Of these, flatus is of particular concern, in that it poses a serious problem in group living, while diarrhea and constipation due to dehydration are associated with significantly decreased life satisfaction in patients receiving these agents.
- Hypoglycemia must be treated with glucose (available in powder, tablet or gel form) in patients receiving α -GI in combination with some other agent.
- It is safer to discontinue α -GIs, as their disadvantages are highly likely to occur in patients with diabetes receiving these agents under emergency circumstances, such as refugee camps/shelters.

4.4. Biguanides

- Given that gastrointestinal symptoms are likely to develop early after their initial use, patients with diabetes should not be started anew on biguanides under emergency circumstances.
- It is preferable to discontinue biguanides in diabetic disaster victims with poor health early, given that dehydration is known to increase the risk of lactic acidosis and that contingencies, such as diarrhea or infection, are likely to occur under emergency circumstances.

4.5. Thiazolidinediones (TZDs)

- TZDs promote tubular sodium reabsorption leading to increased plasma sodium levels. Therefore, these agents are contraindicated in patients at high risk of developing

cardiac failure. It is advisable to discontinue TZDs early in patients with diabetes showing signs of swelling/edema, particularly under emergency circumstances, such as refugee camps/shelters, where they tend to be given salty foods.

4.6. Dipeptidyl peptidase-4 (DPP-4) inhibitors

- DPP-4 inhibitors promote insulin secretion glucose-dependently and therefore require no dose adjustments even in patients with an irregular eating habit/pattern.
- DPP-4 inhibitors are not associated with hypoglycemia or acute-onset adverse events when used alone and are therefore considered among the oral antidiabetic agents suitable for emergency use.
- DPP-4 inhibitors have been shown to be highly useful in emergency diabetes care after the Great East Japan Earthquake.
- As DPP-4 inhibitors lead to severe hypoglycemia when used in combination with an SU, it is desirable to reduce the dose of any particular SU when combined with a DPP-4 inhibitor.

4.7. Sodium glucose co-transporter 2 (SGLT2) inhibitors

- Under emergency circumstances where insufficient water supplies are likely to be associated with dehydration or worsening of urinary tract infection in patients with diabetes, care should be exercised in using SGLT2 inhibitors, which are linked not only to dehydration but also to increased risk of lower limb amputation or Fournier's gangrene in the labia.

5. Diet/exercise therapy

5.1. Diet therapy for diabetic disaster victims

- Under emergency circumstances where food is in short supply, patients with diabetes should eat what is made available, but only in amounts that they really need and not to eat all that is served, out of regard for those around them.
- Patients with diabetes should remember that, under emergency circumstances, high-carbohydrate foods, such as fast foods, "onigiri" (rice balls), pastries, and canned foods, are more likely to be served than protein or vegetable foods.
- Diabetic disaster victims should try to adhere to their usual dietary intake as closely as possible, with attention given to calorie labeling on the foods served, and, when eating noodle soups, refrain from drinking all the broth, even under circumstances where it cannot be easily disposed of. They should also take care to eat vegetables or protein meals first, and carbohydrates later.
- In response to the JDS-initiated surveys⁴, most dietitians reported increases in the intake of carbohydrates, such as fast foods, sweets, and pastries, as well as decreases in the intake of meats, fruits, vegetables, and milk fat, even among those

who had resumed their life at home, after the Great East Japan Earthquake.

5.2. Exercise therapy for diabetic disaster victims

- Most disaster sites were un conducive to exercise therapy.
- Diabetic disaster victims tend to suffer from lack of physical activity, as they find exercise difficult to practice out of regard for other refugees, become depressed or prefer to stay indoors.
- Diabetic disaster victims should be encouraged to perform leg bending and stretching exercises to prevent deep vein thrombosis (DVT). Care should also be taken to watch for hypoglycemia, given that post-disaster shortages of gasoline can lead to increases in walking, which, combined with increases in physical activity associated with recovery works, may contribute to an increase in the incidence of hypoglycemia.

6. Response measures for hyperglycemia, hypoglycemia and diabetic coma

- Glycemic control, which may be stable under everyday circumstances, may deteriorate leading to hyperglycemia, hypoglycemia or diabetic coma in patients with diabetes under emergency circumstances.
- Thus, particular attention should be given to factors that are likely to contribute to hyperglycemia and hypoglycemia.

6.1. Response measures for hyperglycemia

- Given that avoidance of hypoglycemia takes precedence over correction of hyperglycemia in diabetic disaster victims, they may be allowed to remain relatively hyperglycemic (fasting glucose range, 150-200 mg/dL) for a short time immediately after the disaster.

6.1.1. Symptoms of hyperglycemia

- Symptoms of hyperglycemia include mouth dryness, polydipsia, and polyuria.

6.1.2. Factors likely to contribute to hyperglycemia

- Difficulty in continuing with insulin injections
- Stress associated with drastic changes in living environment
- High-calorie/high-carbohydrate diet

6.1.3. Response measures for hyperglycemic states

- Low-dose, ultra-rapid-acting insulin may be used to treat a hyperglycemic state which is associated with deteriorating health in diabetic disaster victims. Emergency glycemic control should be implemented in these patients according to the sick-day rules.

- Long-acting insulin should be continued as usual in disaster victims with type 1 diabetes, irrespective of their dietary intake which may be irregular.

6.2. Response measures for hypoglycemic states

6.2.1. Symptoms of hypoglycemia

- Symptoms of sympathetic nerve system stimulation due to acute decreases in blood glucose to below normal
 - These include sweating, anxiety, palpitation, tachycardia, tremor of the extremities, and facial pallor.
- Central nervous system (CNS) symptoms reflecting energy deficiency in the CNS due to decreases in blood glucose to around 50 mg/dL.
 - These include headache, blurred vision, and sleepiness.
 - Symptoms associated with glucose decreases to below 50 mg/dL include diminished consciousness, abnormal behavior, muscle twitching, and lead to coma.
- Care should be taken to watch for coma without symptoms of hypoglycemia in patients with autonomic failure from whom symptoms of sympathetic nervous system stimulation may be absent and in whom hypoglycemia may occur repeatedly.
- Caution should be exercised in interpreting abnormal behavior in elderly patients with hypoglycemia, which may be easily mistaken for that associated with dementia in the elderly.

6.2.2. Differential diagnosis of hypoglycemic coma versus hyperglycemic coma

- The differential diagnosis of patients with diabetes with impaired consciousness includes both hypoglycemic and hyperglycemic coma, and ideally is made using blood glucose measurement. However, a glucose 50% solution (20 to 40 mL) may be intravenously injected to assist in the diagnosis of patients in whom no differential diagnosis has been established. Even where only portable blood glucose meters are available, blood glucose measurements should be performed in these patients as soon as possible.

6.2.3. Factors thought likely to contribute to hypoglycemic coma

- These include delayed or insufficient dietary/carbohydrate intake due to changes in living environments; physical activity of greater-than-usual intensity; and nighttime or early morning hours following hard or prolonged work.

6.2.4. Response measures for hypoglycemic states in diabetic disaster victims

- Glucose (5-10 g) or glucose-containing water (150-200 mL) may be given to treat hypoglycemia in patients with

diabetes. Alternatively, sucrose (sugar) may be used at twice the dose of glucose (10-20 g) for this purpose. Care should be taken to ensure that glucose is given to patients being treated with α -glucosidase inhibitor therapy. Glucose (glucose-containing water)/sucrose should be given at the same dose in those in whom hypoglycemia is shown to persist 15 minutes later.

- In patients who cannot orally ingest glucose/sucrose, glucose should be applied between the teeth and the gum line or, if available, 1 vial of glucagon should be injected, and the patient immediately transferred to a nearby healthcare facility.
- In patients with hypoglycemia serious enough to lead to impaired consciousness, impaired consciousness may recur even after initial recovery with expedient treatment.

6.2.5. Prevention of recurrent hypoglycemia in diabetic disaster victims

- Consideration should be given to reducing the dose of any antidiabetic medication likely to be associated with hypoglycemia such as an SU or discontinuing it in patients with type 2 diabetes under emergency circumstances.
- Care should be taken to reduce the dose of any ultra-rapid-acting insulin used in patients with type 1 diabetes under emergency circumstances.

6.3. Response measures for diabetic coma

- Contributing factors, such as infection, massive intake of carbohydrates, and dehydration can induce an absolute or relative deficiency of insulin secretion leading to acute metabolic derangement in patients with diabetes.
- The causes of diabetic coma include diabetic ketoacidosis and hyperosmolar-hyperglycemic syndrome. While the ketone production in the latter is relatively small compared to diabetic ketoacidosis, if it is severe enough to cause diabetic coma, this can ultimately result in death, unless properly treated.
- Initial treatments for diabetic coma include sufficient fluid infusion, correction of electrolyte imbalance, and appropriate use of insulin.

6.3.1. Pathophysiology of diabetic ketoacidosis and hyperosmolar hyperglycemic syndrome

Diabetic ketoacidosis—

- Diabetic ketoacidosis is defined as a condition characterized by hyperglycemia (≥ 300 mg/dL), hyperketonemia, and acidosis resulting from extreme insulin deficiency and increased secretion of insulin-counter-regulatory hormones such as cortisol and adrenalin.
- Symptoms of diabetic ketoacidosis include gastrointestinal adverse events (nausea, vomiting, abdominal pain) and weakness or fatigue.

Hyperosmolar hyperglycemic syndrome—

- Hyperosmolar hyperglycemic syndrome is defined as a state of circulatory insufficiency associated with hyperglycemia (≥ 600 mg/dL) and hyperosmolality due to severe hydration in which no marked acidosis is seen.
- Symptoms of hyperosmolar hyperglycemic syndrome include fatigue, headache and gastrointestinal adverse events.
- Where no apparatus for plasma osmotic pressure measurement is available, plasma sodium (Na), glucose and blood urea nitrogen (BUN) values should be measured in patients with suspected hyperosmolar hyperglycemic syndrome, and plasma osmotic pressure calculated with these measured values according to the following equation:

$$\begin{aligned} \text{Plasma osmotic pressure} &= 2 \times \text{Na value (mEq/L)} \\ &+ \text{glucose value (mg/dL)} / 18 \\ &+ \text{BUN value (mg/dL)} / 2.8 \end{aligned}$$

Reference (normal) value for plasma osmotic pressure
: 285 to 295 mOsm/L

6.3.2. Differential diagnosis of hyperglycemic coma versus hypoglycemic coma

- The differential diagnosis of patients with impaired consciousness includes both hyperglycemic and hypoglycemic coma, and ideally is made by measuring blood glucose. However, a glucose 50% solution (20 to 40 mL) may be intravenously injected to assist in the diagnosis of patients in whom no differential diagnosis has been established.

6.3.3. Factors thought likely to contribute to hyperglycemic coma include:

- Missed insulin injections; and
- Infection, massive carbohydrate intake, and dehydration.

6.3.4. Response measures for diabetic coma

- Sufficient fluid infusion followed by continuous insulin infusion
 - With the severity of dehydration grossly estimated based on changes in body weight, normal saline infusion (500–1,000 mL/hour) should be initiated in patients with diabetic coma, at a rate of 200–500 mL/hour for the first few hours, then adjusted to their urine output.
 - Low-dose continuous intravenous insulin infusion should then be initiated as the method of choice, which involves intravenous bolus injection of short-acting insulin of 0.1 U/kg followed by continuous intravenous infusion of insulin at 0.1/kg/hour using an infusion pump.

- Insulin dose should be reduced, and maintenance fluid infusion containing glucose initiated, in patients whose glucose level is confirmed to have decreased to 250–300 mg/dL.
- As a rule, bicarbonate (HCO_3^-) should not be used to correct acidosis in patients with an arterial pH of 7.0 or higher.
- Monitoring of hypokalemia during treatment
 - In patients being treated for diabetic coma, serum potassium concentrations should be maintained at 3.5 to 5.0 mEq/L using intravenous potassium fluids of 40 mEq/L.
 - QT interval prolongation, T wave flattening, and U wave appearance should be closely monitored electrocardiographically as hallmark signs of hypokalemia.
- Response measures for triggers for diabetic coma
 - Antibiotics should also be given at treatment initiation in patients with diabetes with suspected infection.
- Potential complications to be monitored during treatment include:
 - Cardiac failure resulting from excessive fluid replacement, particularly in elderly patients or patients with a history of ischemic heart disease (IHD)
 - Cerebral edema or shock resulting from rapid decreases in glucose (occurring at > 300 mg/dL/hour)
- Diabetic coma patients should be immediately transferred to the nearest tertiary facility staffed by diabetologists, with the referral forms detailing the fluid replacement and insulin therapy implemented in these patients.

7. Response measures for diabetic complications**7.1. Retinopathy**

- According to the patient questionnaire conducted by the JDS after the Great East Japan Earthquake, retinopathy developed or worsened in 41 of the 2,503 respondents with diabetes, leading to a renewed awareness of the need for retinopathy management under emergency circumstances.
- The presence or absence of retinopathy in patients with diabetes cannot be determined based on their subjective symptoms alone and calls for ocular fundus examination by ophthalmologists. If available, the “Diabetic Eye Notebook” provides information on the presence or absence of retinopathy and the stage of disease and is helpful in responding to the needs of these patients even under emergency circumstances.
- The following two types of retinopathy call for immediate medical attention: 1. rapidly progressing retinopathy requiring photocoagulation therapy; and 2. retinopathy with vitreous body hemorrhage requiring vitreous surgery. In order to arrest progression of retinopathy, it is crucial that patients in these stages are treated appropriately. Other conditions

requiring immediate medical attention include elevated intraocular pressure due to retinal detachment and neovascular glaucoma.

7.2. Neuropathy

- Diabetic neuropathy affects patients in refugee camps/shelters in various ways. Emergency responses include prevention of diabetic foot ulcers, prevention and treatment of asymptomatic hypoglycemia, and symptomatic treatment of pain.

7.3. Nephropathy

7.3.1. Access to dialysis therapy to be secured for dialysis patients

- In a widespread, large-scale disaster associated with devastating damage to healthcare facilities and equipment, serious healthcare personnel shortages, loss of water, medication and other resources, and disruption of transportation in affected areas, every effort should be made to secure dialysis patients' access to dialysis therapy required for their survival, as it may not be made readily available under emergency circumstances.
- The initial disaster response calls for integrated action not only in gathering relevant information, such as the capacity of available dialysis facilities and the number/list of dialysis patients requiring to be transferred from non-dialysis facilities for dialysis, but also in ensuring transfer of these patients to the dialysis facilities for dialysis as their capacity permits.
- The Japanese Society for Dialysis Therapy is promoting the use by dialysis patients of a portable dialysis card (whose data can be overwritten on a computer) to assist in the emergency management of medical information for dialysis patients. However, in addition to this, dialysis patients should include in their emergency packs or "go bags", about 7 days' worth of their oral medications and insulin injection kits and to carry at all times, written instructions on how to self-administer their medications when not eating regularly and how to deal with their sick days, as well as their Diabetes Coordination Notebook/Drug Profile Book.
- Once access to emergency dialysis has been secured for patients, attention should focus on gathering information on the medical equipment/devices, medications, dialysates, water supplies required at affected facilities, as well as on securing these resources, and recovering transportation in collaboration with the local government agencies, toward restoration of local dialysis capabilities. To this end, it is essential to develop local medical care networks involving government agencies and private businesses likely to be available for collaboration under emergency circumstances.

7.3.2. Preventive measures for acute kidney injury (AKI)

- Acute kidney injury (AKI) occurs among disaster victims when continued compression of part of their bodies, particularly their limbs, by heavy objects causes muscle injury and

Table 2 | Cases of pulmonary embolism (PE) reported after the 2004 Niigata-Chuetsu Earthquakes

Case	Duration of stay in vehicles (days)	Type/size of vehicle	Seat position	Date of onset	Prognosis	Use of sleep inducers	Nighttime bathroom trips
76-year-old woman	2	Standard-size vehicle	Back seat	October 25, 2004	Alive	Yes	Yes
79-year-old woman	14	Standard-size vehicle	Back seat	November 7, 2004	Alive	No	Yes
60-year-old woman	14	Standard-size vehicle	Back seat	November 7, 2004	Alive	No	Yes
43-year-old woman	4	Minicar	Unknown	October 27, 2004	Dead	Yes	No
48-year-old woman	5	Van	Driver's seat	October 28, 2004	Dead	Yes	No
50-year-old woman	6	Minicar	Unknown	October 29, 2004	Dead	Yes	No
50-year-old woman	2	Unknown	Unknown	October 25, 2004	Dead	Unknown	Unknown

necrosis, which, upon decompression, induces a massive inflow of necrotic cell-derived potassium, myoglobin and lactic acid, into bloodstream, leading to crush syndrome. Indeed, AKI was shown to be the second leading cause of death next to traumatic injury among victims in large-scale disasters, such as the 1995 Great Hanshin-Awaji Earthquake and the 2004 Niigata-Chuetsu Earthquakes. Patients at high risk of AKI whose limbs have been compressed for long durations require relief incision, extracellular fluid replacement, and appropriate treatments based on early diagnosis of AKI (i.e., body fluid management, hyperkalemia treatment, acidosis correction, and dialysis).

- Vomiting and diarrhea associated with viral gastroenteritis and shortages of drinking water may lead to the onset of prerenal AKI in some patients. Care should be taken to encourage affected patients to practice hand washing and disinfection and to wear masks, as well as to prevent dehydration in these patients through appropriate nutritional management and by securing drinking water supplies.

7.4. Deep vein thrombosis (DVT)

- While no reports are available to show that deep vein thrombosis (DVT) is frequently observed in patients with diabetes under emergency circumstances, DVT is of interest to all disaster victims including those with diabetes.

7.4.1. Characteristics of DVT occurring after large-scale disasters

- DVT is reported to be common in people staying in vehicles for 3 nights or more, highly likely to occur in those staying in sedans and minicars, but less likely to occur in those staying in vans^{10–12}.
- Sleeping in driver seats or sleeping while sitting up (requiring all passengers to stay in that position) is associated with increased risk of DVT.
- While post-disaster DVT and pulmonary embolism (PE) are shown to occur across all age groups, they are reported to occur more frequently among women in Japan (Table 2).
- Curbed nighttime bathroom trips (staying still for a prolonged time), use of sleep inducers, limb injury (including bruises), shortages of water and food, and limited access to bathrooms are potential risk factors for DVT¹³.
- In refugee camps/shelters, sleeping in “zakone” fashion (sleeping huddled together directly on the floor) is also shown to be a risk factor for DVT. Indeed, during the Blitz in 1940, shelters were put in place inside subway stations, which required people to sleep huddled together, resulting in many deaths due to PE¹⁴. The use of makeshift beds, installed later, led to fewer deaths.
- DVT was reported to have frequently occurred at refugee shelters in the 2004 Niigata-Chuetsu Earthquakes, 2007 Noto Peninsula Earthquake, 2008 Iwate-Miyagi Nairiku (Inland) Earthquake, and 2011 Great East Japan Earthquake^{15–18}.

Again, DVT was confirmed to have occurred in residents in temporary housing units after the Iwate-Miyagi Nairiku (Inland) Earthquake and the Great East Japan Earthquake¹⁹, where staying still or remaining indoors all day were potential causes of DVT.

- Despite the 8 years that had passed since the Niigata-Chuetsu Earthquake, DVT was also shown to still be present in a number of victims, persisting long after the disaster. Similarly, DVT was shown to persist in many victims more than 2 years after the Great East Japan Earthquake.

7.4.2. Post-earthquake (disaster) response measures for disaster victims with DVT

- The “Guidelines for Diagnosis and Treatment of Deep Vein Thrombosis (DVT) in Residents in Areas Affected by the Niigata-Chuetsu Earthquake”, developed by the Niigata Prefecture Medical Association and Niigata University are of particular interest²⁰.
- After 1 to 3 months of using compression stockings, DVT was shown to have disappeared in some victims of the Niigata-Chuetsu Earthquake, Niigata-Chuetsu-Okii (Offshore) Earthquake, Iwate-Miyagi Nairiku (Inland) Earthquake and the Great East Japan Earthquake. Again, it was reported that use of compression stockings led to disappearance of DVT in 30% of all cases detected in some shelters after the Great East Japan Earthquake.
- Anticoagulation therapy is shown to be effective when initiated early. Consideration should also be given to the use of new anticoagulants that do not require regular coagulation monitoring of the prothrombin time/international normalized ratio (PT-INR).

7.4.3. Post-earthquake (disaster) preventive measures for DVT

Immediately post-disaster—

- Prevention of DVT in disaster victims staying in vehicles: Care should be taken to instruct disaster victims planning to stay in vehicles to limit the number of people staying in the same car to a minimum; to do leg lifting; not to use sleep inducers without careful consideration; to use compression stockings; and to drink water regularly.

Up to post-disaster week 2 (during shelter stay)—

- The incidence of DVT in refugee camps/shelters was shown to peak 2 weeks after the Great East Japan Earthquake.
- Disaster victims should be instructed to have their lower limb injuries, if any, treated properly; to secure walking sticks for elderly members or those who have difficulty walking unaided; to prevent dehydration by ensuring that they have enough meals and drink enough water; not to stay or lie still for a prolonged time in their shelters.

- In shelters where refugees are required to sleep huddled together on the floor, they should be instructed to use compression stockings for the prevention of DVT.
- During this period, every effort should be made to ensure that makeshift beds are put in place at refugee shelters as early as possible.

Up to post-disaster month 6—

- Cerebral infarction, which was thought likely to be paradoxical cerebral infarction due to post-DVT, was reported to occur frequently during the first 6 months after the disaster. Therefore, care should be taken to ensure that high-risk disaster victims undergo lower limb venous echocardiography and are instructed to put on compression stockings during this period.

From post-disaster year 1 onwards—

- When detected more than one year post-disaster, DVT tends to be chronic and refractory. To prevent the growth of chronic and relapsing thrombi, lower limb venous echocardiography or D-dimer measurement should be performed every 6 months in disaster victims with DVT whose D-dimer value is shown to be 2 times the reference value or higher.

7.5. Infections

7.5.1. The risk of infection in diabetic disaster victims

- Drastic changes in a living environment are associated with increased risk of infection.
- In refugee camps/shelters, glycemic control of patients with diabetes who are susceptible to infection tends to deteriorate to a similar degree to that during sick days. Under emergency circumstances, changes in environmental factors, such as hygiene, sleeping, and clothing, food and shelter conditions, lead to cumulative psychosomatic fatigue, thus compromising immunity and increasing the risk for infection.
- Given that these conditions in patients with diabetes are likely to become too severe to be amenable to on-site therapeutic intervention at shelters and can often be life-threatening, all patients found to be immunocompromised and at high risk of infection should be transferred to the nearest healthcare facility providing rearguard support for disaster relief.
- It should also be noted that diabetic angiopathy and peripheral neuropathy increase the risk of minor traumatic injury.

7.5.2. Restricted access to bathrooms as a contributing factor to the risk of urinary tract infection

- Restricted access to bathrooms leads to increased residual urine associated with impaired bladder dysfunction, increasing the risk for urinary tract infection. Again, insufficient water intake is a risk factor for urinary tract infection.

Therefore, diabetic disaster victims should be encouraged to drink sufficient water to maintain their urine output and frequency at an appropriate level.

7.5.3. Response measures against growth of pathogens colonized around insulin injection sites

- Even under circumstances where diabetic disaster victims are likely to have difficulty bathing regularly, they should be encouraged to practice hand hygiene, face washing, and oral cavity hygiene to prevent mucosal infection, as well as to clean up insulin injection sites with alcohol swabs, wet washcloth or water before and after injections.

7.5.4. The risk of infection associated with an epidemic in refugee shelters

- In shelters where refugees share the same space for long periods of time, human-to-human infections should be closely monitored. Consideration should be given to the risk of food-borne outbreaks that are increased under these circumstances.
- Air-borne infections (e.g., tuberculosis) and droplet infections (e.g., influenza) should be proactively identified and aggressively treated in refugee shelters. Again, diabetic refugees are encouraged to use non-woven masks and practice hand hygiene, which decrease the risk of infection. All refugees are encouraged to air their shared space frequently, even in wintertime. Again, it is desirable that attention is given to ensuring that diabetic refugees are given priority for influenza or pneumococcal vaccination.
- It is desirable that emergency operations are implemented with the pre-identified needs of diabetic refugees in mind, particularly in large-scale shelters²¹.

7.6. Cardiovascular disease (CVD)

7.6.1. Ischemic heart disease (IHD)

- Acute coronary syndrome (ACS) is shown to increase among disaster victims due to mental stress, inappropriate dietary habits, lack of physical activity and lack of sleep²².

Points to consider in the diagnosis of IHD—

- While symptoms of angina pectoris (AP) and myocardial infarction (MI) are often described as anterior chest tightness or oppression, AP and MI may be associated with such symptoms as anorexia, nausea and dyspnea in the elderly.
- Individuals with suspected AP or MI should be examined for orthopnea, peripheral coldness, the presence or absence of rales or cardiac murmur, blood pressure and heart rate.

Initial response measures for patients with diabetes with CVD—

- Initial response measures for patients with diabetes with CVD include supplementing oxygen and securing

reliable intravenous access, with consideration also given to referring them to cardiologists for further investigation and treatment.

- In patients with diabetes with a history of CVD, discontinuation of their CVD medications increases the risk of their underlying CVD. Therefore, care should be taken to ensure that they continue with their CVD medications as long as possible.

7.6.2 Cardiac failure (CF)

- As with IHD, the incidence of cardiac failure (CF) increased following the Great East Japan Earthquake due to such factors as disaster-related mental stress²².

Points to consider in the diagnosis of CF—

- Care should be taken not to miss signs and symptoms of CF (e.g., edema, rales, third heart sound [S3]).
- Increased stress leads to elevated blood pressure or arrhythmia through sympathetic activation thus predisposing affected individuals to CF.
- Patients with CF should be examined for contributing factors (e.g., excessive salt intake, fatigue, sleeplessness, elevated blood pressure).

Initial response measures for patients with diabetes with CF—

- Initial response measures include sufficient oxygen supplementation, nitrate administration (in those with diastolic blood pressure 140 mmHg or higher), and diuretic administration (in those showing evidence of congestion).
- The use of catecholamine should be considered in patients with shock.
- Care should be taken to identify the medications which these patients are currently receiving and to ensure that they continue treatment with these medications as long as possible.

7.6.3. Stress cardiomyopathy

- Stress cardiomyopathy (or “takotsubo-like” cardiomyopathy) is a myocardial disorder which occurs primarily due to stress and whose hallmark feature in many cases is left ventricular contractile impairment.

Points to consider in the diagnosis of stress cardiomyopathy—

- Stress cardiomyopathy is commonly seen in postmenopausal elderly women.
- Chief complaints in stress cardiomyopathy include chest pain dyspnea similar to that reported in ACS, thus calling for differential diagnosis between stress cardiomyopathy and ACS.

Initial response measures for stress cardiomyopathy—

- Patients complaining of chest symptoms suggestive of IHD should be immediately examined for vital signs, started on oxygen supplementation, and monitored using electrocardiography.
- Patients with stress cardiomyopathy often present with ST-segment elevation as do patients with MI. Therefore, in these patients MI needs to be ruled out and, consideration should be given to referring such patients to healthcare facilities staffed by cardiologists for immediate treatment.

7.7. Hypertension (acute exacerbation)

7.7.1. Disaster hypertension

- Hypertensive residents in the hard-hit areas in the 1995 Great Hanshin-Awaji Earthquake and the 2004 Niigata-Chuetsu Earthquake showed a significant increase in blood pressure immediately following the disaster through to weeks or months later, resulting in this form of hypertension being termed, “disaster hypertension”^{23,24}.

7.7.2. Response measures for disaster hypertension

Treatment of hypertension in the acute phase—

- Given that increased salt intake from emergency food is thought to contribute to prolonged blood pressure elevation, dietary instructions/nutrition management focused on salt restriction should be of particular interest.
- Preemptive use of sympathetic blockers (α - or β -blockers) in hypertensive patients^{25,26}, as well as antihypertensive agents, including the renin-angiotensin system (RAS) blockers in dialysis patients²⁷, was effective in preventing post-disaster blood pressure elevation, thus providing the rationale for their use from before to after the disaster. Calcium channel blockers (CCBs) are effective as add-on therapy for acute-phase blood pressure elevation in preventing post-disaster elevation²⁵ and should be used in this setting due to their onset of action, reliability, and safety profiles.

Health issues in hypertensive/patients with diabetes in the chronic phase—

- Even in the chronic phase, exacerbation or worsening of chronic diseases, e.g., diabetes, hypertension, and dyslipidemia, can persist for several months or more than 1 year among some disaster victims with hypertension/diabetes^{28,29}.
- Persistent exacerbation of these chronic diseases may be accounted for primarily by the following factors: bouts of despair, anxiety about uncertainty, and stress relative to the significance of disaster events experienced, e.g., death or injury of close relatives; psychological factors, e.g., fatigue

Table 3 | Post-disaster risk factors for stroke

Parameter	Post-disaster risk factors
Blood pressure	Elevation of blood pressure immediately after a disaster
Thrombus	Increased blood coagulation and fibrinolysis, elevated blood viscosity (e.g., hematocrit, fibrinogen), discontinuation of anticoagulants
Glucose	Hyperglycemia associated with stress-induced activation of sympathetic nervous system, hypothalamic-pituitary-adrenal axis and increased cytokine production
Arrhythmia	Hyper-LDL-cholesterolemia associated with long-term suboptimal nutritional status

and decreased interest in physical activity; decreased adherence to drug treatment and medical consultation due to deterioration in available healthcare; deterioration of living conditions and hygiene status due to the damage caused to environment; and emergency nutritional issues.

7.8. Cerebral infarction (CI)

- Known causes of post-disaster acute-onset stress among disaster victims leading to elevation of blood pressure, LDL-cholesterol and HbA1c values include increased salt intake and obesity resulting from overnutrition and lack of physical activity.
- The JDS Committee⁴ revealed a marked increase in the consumption of (rice-based) main dishes as well as a marked decrease in the consumption of (vegetable-containing) side dishes among patients with diabetes following the disaster. It is easy to imagine that these trends, which are not only dominant in the acute phase but persist for long periods after the disaster, may contribute to the onset of cerebrovascular disease such as atherothrombotic cerebral infarction and cerebral hemorrhage, both of which are associated with markedly decreased quality of life (QOL). Again, of all disaster victims, patients with diabetes are not only the most vulnerable to disaster-related changes in their living environment but the most susceptible to stroke (Table 3).

7.9. Need for mental support

7.9.1. Disaster-induced stress

- Disaster-induced stress in victims takes various forms and includes stress associated with trauma due to immediate life-and-death crises involving them or those around them; stress associated with loss of someone close to them; and stress associated with changes in their home, workplace and school environments.
- Furthermore, these experiences of trauma or loss often lead to “survivor’s guilt” (i.e., feeling bad about having survived a

situation that other have not) or a sense of guilt or a feeling of remorse (i.e., feeling bad about not having taken the right action in response to an emergency situation that led to unintended consequences) among the disaster victims.

- In addition to stress to which all disaster victims are susceptible, difficulties in securing diabetes medications and food required for diabetes control, as well as anxiety about worsening of diabetes, leads to stress among diabetic disaster victims. Indeed, disaster-induced stress is reported to worsen glycemic control in patients with diabetes.^{30,31}

7.9.2. Mental disorders likely to increase after a disaster

- Mental disorders likely to occur after a disaster include depression, posttraumatic stress disorder (PTSD), anxiety disorders (e.g., panic disorder [PD]), dependence (e.g., alcohol dependence), and somatoform disorders.
- In addition, diabetic disaster victims can be adversely affected not only mentally (e.g., posttraumatic stress response, depressive response, and grief reaction) but physically (e.g., changes in alcohol drinking and dietary habits) after the disaster.

7.9.3. Posttraumatic stress response

- Posttraumatic stress response in disaster victims presents variously as re-experiencing/flashback symptoms (in which the very scene that led to trauma are being repeatedly invoked); avoidance symptoms (i.e., withdrawal from the trauma-related scene); sleeplessness; irritation; decreased concentration; excessive wariness; and excessive alertness (e.g., being alarmed at a slight sound).
- Acute stress disorder (ASD) is diagnosed if three major symptoms of PTSD (i.e., excessive alertness, avoidance symptoms, and re-experiencing/flashback symptoms) are transiently markedly present but disappear within a month, while PTSD is diagnosed if these symptoms are persist for at least 1 month leading to major distress or difficulties in continuing with life as normal.

7.9.4. Considerations in post-disaster, long-term mental support for diabetic disaster victims

- Care should be taken to examine whether or not diabetic disaster victims are having difficulty in controlling their disease due to sleeplessness, irritation, anxiety, frustration, irritability, decreased concentration/motivation/interest, and increased alcohol/dietary intake, all of which are associated with disaster-related posttraumatic stress response, depressive response, and grief reactions.
- It should be noted that it may be a major uplifting experience for diabetic disaster victims to share their major experiences, such as trauma and loss of life, with other victims; this experience may also help build a relationship of mutual trust among disaster victims, thus making patients with diabetes’ efforts to control their disease less difficult.

Table 4 | Recommended emergency supplies checklist

Diabetes care-related item	Checkbox	Essential/emergency item	Checkbox
Oral medications	<input type="checkbox"/>	Valuables (e.g., cash, passbooks)	<input type="checkbox"/>
Insulin self-injection kits	<input type="checkbox"/>	Flashlight/batteries	<input type="checkbox"/>
Glucose (e.g., tablets) for hypoglycemia	<input type="checkbox"/>	Mobile phone/battery charger	<input type="checkbox"/>
Diabetes Coordination Notebook	<input type="checkbox"/>	Drinking water	<input type="checkbox"/>
Drug Profile Book (or photocopy of prescriptions)	<input type="checkbox"/>	Emergency food	<input type="checkbox"/>
First-aid box	Checkbox	Extra clothes	<input type="checkbox"/>
Regular medications	<input type="checkbox"/>	Slippers	<input type="checkbox"/>
Antiseptics	<input type="checkbox"/>	Wet wipes	<input type="checkbox"/>
Adhesive plasters	<input type="checkbox"/>	Plastic bags	<input type="checkbox"/>
Thermometer	<input type="checkbox"/>	Spare glasses	<input type="checkbox"/>
Masks	<input type="checkbox"/>	Memo pads/writing utensils	<input type="checkbox"/>
		Toiletry goods/towels	<input type="checkbox"/>
		Toilet paper	<input type="checkbox"/>
		Sanitary goods	<input type="checkbox"/>
		Cotton work gloves	<input type="checkbox"/>

- Patients with diabetes with mental problems should be encouraged to improve themselves both physically and mentally, while working closely with appropriate medical specialists. They should also be encouraged to seek consultation from specialists about their problems, particularly if they have distress due to mental problems or difficulty continuing with their life or cannot count on support from those around them.

IV. DISASTER PREPAREDNESS FOR PATIENTS WITH DIABETES

1. Evacuation packing

- There is no doubt that disasters will continue to occur in the years to come. While Japan is now in a position to launch task force headquarters for disaster relief immediately, this does not guarantee immediate delivery of relief supplies to all disaster areas. Therefore, patients with diabetes are encouraged to have their emergency kits ready for

evacuation, with a determination to “take care of themselves” during the first 3 days in the ultra-acute phase.

- Patients with diabetes are encouraged to make sure that their emergency kits are stocked with such basic emergency supplies as water, extra clothes, portable radio, flashlight, and extra batteries. They are encouraged to build their own kits based on the recommended emergency supplies checklist (Table 4). They are encouraged to stock 1 week worth of these supplies in their emergency kits, while noting that to include too much would defeat the purpose of an evacuation kit. Backpacks as emergency kits should weigh up to 10 to 15 kg; wheeled carry bags would do as well. They should keep their emergency kits easily accessible, so they can take them when they have to evacuate. They should also ensure that food and batteries are checked regularly for their expiration dates and replaced regularly.
- They should also check to see if their kits include spare glasses (particularly for contact lens wearers), masks, and gloves, which tend to be left behind. It is also advisable to



Figure 3 | “Itsudemo-anshin” (“ever carefree”) drug pouch.

include sanitary goods and portable toilets in their emergency kits.

2. Medication stockpiling

- Patients with diabetes are encouraged to keep their usual medications, insulin kits and SMBG kits in one place, so they can access them easily when they have to evacuate.
- Given that any disaster that occurs while they are at work may make it difficult to go home, patients with diabetes are also encouraged to stockpile their medications at their workplaces. They are also encouraged to have their Diabetes Coordination Notebook/Drug Profile Book and health insurance cards ready for evacuation, as these will assist in having their medications prescribed/dispensed after evacuation.

3. Pill organization (using pill cases)

- Patients with diabetes are encouraged to prepare pill cases, stockpile 1 week worth of their medications in these cases, and carry these at all times. Patients with diabetes requiring insulin therapy are encouraged to stockpile 1 week worth of insulin syringes and SMBG kits for emergencies. Organizing their medications in their customized “itsudemo-anshin” (“ever carefree”) drug pouches ensures that they are available for a week while travelling, with the pouch needing to be checked and refilled/replaced on a regular basis (Figure 3).

4. Diabetes Coordination Notebook, Drug Profile Book and emergency contact information

- Patients with diabetes are encouraged to carry their Diabetes Coordination Notebook and Drug Profile Book containing their emergency contact information in the above-mentioned drug pouch at all times, making it easy to locate them under emergency circumstances. Patients with diabetes are encouraged to carry the drug pouch during their outpatient visits and review the entries at all times, so this becomes an automatic habit.

5. Mobile device availability/preparedness

- It is a matter of utmost concern to all families to confirm the safety of family members living in disaster areas. Therefore, patients with diabetes are encouraged to develop a plan for communicating with their family and friends during emergencies, and to practice using it beforehand.
- Patients with diabetes are also encouraged to practice using emergency voice message/message board services, which are available for free on the 1st and 15th days of each month, during New Year’s holidays, and during “Disaster Prevention Weeks”.
- They are also encouraged to have battery-operated chargers ready for their mobile phones, so that their mobile phones are available for use under emergency circumstances.

- Mobile phones accounted for the greatest proportion (85%) of all possessions which the diabetic disaster victims reported having at the time of emergency evacuation after the Great East Japan Earthquake. Again, they found their Drug Profile Books most helpful in having their medications prescribed and dispensed on an *ad hoc* basis at their shelters. Thus, the use of an electronic version of the Drug Profile Book with phone call function is now becoming widespread among patients with diabetes.

6. Preparedness for evacuation

- Patients with diabetes are encouraged to confirm with all family member which shelters they plan to evacuate to after a disaster. Given that shelters may be filled to capacity with evacuees immediately after the disaster, they are also encouraged to identify alternative sites, and to confirm their safety.
- Again, under emergency circumstances, where disruption of transportation is likely to make it difficult for patients with diabetes to return home from their workplaces, they are encouraged to identify nearby shelters/impromptu facilities intended use in such situations.

CONCLUDING SUMMARY FOR THE ORIGINAL JAPANESE EDITION

Through the ages, an old saying, “disasters come along when they are no longer in people’s memory”, has held true. Hence, the significance of registering, while still fresh in memory, our disaster relief experiences and lessons from the recent disasters we were unfortunate to have experienced. Thus, the “Research and Survey Committee for Establishing Disaster Diabetes Care Systems Based on Relevant Findings from the Great East Japan Earthquake” was launched by the Japan Diabetes Society in May 2011. Subsequently, a questionnaire was conducted by the Committee among patients with diabetes and health-care providers in disaster areas to investigate the impact of the 2011 Great East Japan Earthquake on diabetes care, with the survey results published in July 2012. Based on these survey results, the “Diabetes Care Providers’ Manual for Disaster Diabetes Care (in Japanese)”, developed by the members of the Committee and other invited authors from relevant specialties, has now been published in book form in March 2014.

A review of the manual reveals that, while it begins with generalities, such as “disaster preparedness”, it not only breaks new ground by detailing the respective roles of healthcare providers involved in disaster diabetes care, including the newly conceived “diabetes medical assistance teams” (DiaMATs) but also covers a range of well-chosen topics from “individualized emergency medical response measures for different forms of diabetes and therapies” to “disaster preparedness for patients with diabetes”, thus constituting a comprehensive and detailed disaster manual. Furthermore, as well as reporting some results from the survey, it offers a unmatched manual on disaster diabetes care. I believe it

will prove immensely helpful in implementing disaster response measures when major disasters occur again.

Last but not least, I would like to extend my sincere thanks to Dr. Jo Satoh and other Committee members for their tenacity of purpose that led to the Committee being launched in May 2011, despite considerable challenges and difficulties that we were still dealing with after the disaster, as well as for all the actions they helped implement over the years. I would also like to thank all the authors for the valuable time and effort they spent in drafting their own chapters at the request of the Committee.

It is my hope that readers will find this manual a valuable and useful resource.

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CONFLICT OF INTEREST STATEMENT

Jo Satoh received honoraria from Boehringer Ingelheim, Eli Lilly and Company, MSD, Ono Pharmaceutical Co., Ltd., Sanofi, and Sumitomo Dainippon Pharma Co., Ltd. Toshinari Asakura received honoraria from Novo Nordisk. TA also received research funding from Eli Lilly Japan. Kazuhiko Hanzawa received honoraria from Daiichi Sankyo Co. Yasushi Ishigaki received honoraria from MSD Ltd., Sanofi Ltd., Bayer Yakuhin Ltd., Takeda Pharmaceutical Co., Novo Nordisk Pharma Ltd., Novartis Pharma Ltd., Ono pharmaceutical company, Kowa pharmaceutical Co., Ltd. YI also received subsidies/donations from MSD Ltd., Ono pharmaceutical company. Takashi Kadowaki received honoraria from MSD Corporation, Daiichi Sankyo Co., Ltd., Takeda Pharmaceutical Co., Ltd., Mitsubishi Tanabe Pharma Corporation, Kowa Pharmaceutical Co., Ltd., Astellas Pharma Inc., Ono Pharmaceutical Co., Ltd., AstraZeneca K. K., Sumitomo Dainippon Pharma Co., Ltd., Sanofi K. K., Eli Lilly Japan K. K., Nippon Boehringer Ingelheim Co. Ltd., Sanwa Kagaku Kenkyusho Co., Ltd., Kyowa Hakko Kirin Co., Ltd., and Taisho Pharmaceutical Co., Ltd. TK also received research funding from MSD Corporation, Daiichi Sankyo Co., Ltd., Novo Nordisk Pharma Ltd., Sanofi K. K., and Takeda Pharmaceutical Co., Ltd. TK belongs to endowed departments by Takeda Pharmaceutical Co., Ltd., TERUMO Corporation, MSD Corporation, Novo Nordisk Pharma Ltd., and Nippon Boehringer Ingelheim Co. Ltd. Hideki Katagiri received honoraria from Astellas Pharma Inc., Daiichi-Sankyo, Taisho Toyama Pharmaceutical Co., Ltd., Mitsubishi Tanabe Pharma Co., Boehringer Ingelheim, MSD K.K., and Novartis Pharma. HK also received subsidies/donations from Astellas Pharma Inc., Novo Nordisk Pharma Ltd., Takeda Pharmaceutical Company Ltd., Sanofi K.K., Daiichi-Sankyo, Eli Lilly Japan K.K., Taisho Toyama Pharmaceutical Co., Ono Pharmaceutical Co., Ltd., Mitsubishi Tanabe Pharma Co., MSD K.K., and Novartis Pharma. Jiro Nakamura received honoraria from

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COMPLIANCE WITH ETHICAL STANDARDS

This article does not contain any studies with human or animal subjects performed by any of the authors.

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