

Dealing with Diabetes During Disasters

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Disclosures

I have no actual or potential financial conflicts related to this activity.

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Learning Objectives Pharmacists & Technicians

At the conclusion of this presentation, the learner should be able to:

1. **Describe** the impact of previous disasters on glycemic control
2. **Discuss** strategies for public health preparedness to address short term and long term needs of people with diabetes during disasters
3. **Outline** an emergency preparedness care plan for a patient with diabetes

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Question:

For patients with diabetes, common causes for ER visits acutely after a disaster include all of the following **EXCEPT**:

- A. Retinopathy
- B. Hypoglycemia
- C. Diabetic ketoacidosis
- D. Diabetic foot infection

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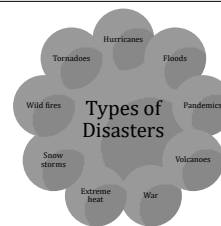
Question:

Which of the following should be part of an emergency kit for a patient with DM?
SELECT ALL THAT APPLY

- A. List of active medications and supplements
- B. 3 months worth of medications
- C. Diabetes testing supplies
- D. Glucose tabs
- E. Water
- F. Soda

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Dealing with Disasters



Disaster impact influenced by:

- Size
- Type
- Duration
- Local infrastructure
- Socioeconomic factors
- Nature of the affected area
- People's experiences with disasters

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Survivors of disasters are often left without:

- Means of communication or transportation
- Electricity / refrigeration
- Access to (healthy) food
- Access to water
- Access to shelter
- Access to meds / medical care

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Pause and ponder

BASED ON YOUR EXPERIENCE, WHAT HAS BEEN THE GREATEST THREAT TO PATIENT CARE DURING THE COVID-19 PANDEMIC?

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What is the impact to patients with diabetes?

Arrieta M. *Am J Med Sci.* 2008;336(2):128-133
 Arrieta M. *Disaster Med Public Health Prep.* 2009;(3):174-182

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What is the impact to patients with diabetes?

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What is the impact to patients with diabetes?

Gulf War, 1991

Table 1. Glycated haemoglobin results (%) in patients before and after the Gulf War

n	NIDDM Group		n	IDDM Group		Total
	Male	Female		Male	Female	
46	20	46	5	11	16	
Period 1:	10.1 ± 2.1	10.1 ± 2.0	10.1 ± 2.0	9.5 ± 1.5	9.6 ± 2.0	10.0 ± 1.8
Period 2:	10.8 ± 2.0	11.2 ± 2.0	10.9 ± 2.0	10.3 ± 1.7	10.2 ± 1.9	10.2 ± 1.8
Period 3:	10.2 ± 2.0	10.5 ± 2.0	10.5 ± 2.0	9.4 ± 1.5	9.8 ± 2.4	9.7 ± 2.1

Table 2. Mean and standard deviations of weight (kg) in the three periods for each group

n	NIDDM Group		n	IDDM Group		Total
	Male	Female		Male	Female	
46	20	46	5	11	16	
Period 1: Mean	78.7 ± 10.3	70.1 ± 8.9	76.1 ± 10.6	67.4 ± 10.6	63.3 ± 14.6	62.2 ± 13.4
Period 2: Mean	79.9 ± 10.4	72.0 ± 10.0	76.0 ± 11.0	69.2 ± 10.3	62.6 ± 15.1	64.7 ± 14.0
Period 3: Mean	78.3 ± 10.4	70.0 ± 9.6	73.0 ± 11.0	67.7 ± 10.4	63.6 ± 14.4	63.5 ± 13.2

Rubenstein A. *Diabetic Medicine.* 1993;10:774-776

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What is the impact to patients with diabetes?

Kobe Earthquake, 1995 (Magnitude 7.2)

Table 2. Scores of 4 factors on the 50-item General Health Questionnaire Given to Diabetic Patients in Kobe (N=157) and Osaka (N=272), Japan, 3 Months After the Earthquake*

Patients	Symptoms		Worry/Anxiety		Social Dysfunction		Severe Depression	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Kobe	2.26(1.13)	1.13	2.72(1.21)	1.21	1.26(1.10)	1.10	0.52(1.11)	1.11
Osaka	1.76(0.92)	0.92	1.76(0.91)	0.91	0.79(0.93)	0.93	0.53(0.93)	0.93

Inui A. *Arch Intern Med.* 1998;158:274-278

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What is the impact to patients with diabetes?

- Levels of glycemic control (A1c), blood pressure, and lipids were compared 6 months before and 6-16 months after Hurricane Katrina
- Patient charts from 3 different diabetes care centers were evaluated
- The impact effected diabetes management, exacerbated disparities, and had health and economic implications

Hurricane Katrina, 2005 (Category 5)

Impact of a natural disaster on diabetes
Table 2. Clinical and laboratory parameters among diabetic patients in three health care systems before and after Hurricane Katrina (38 February 2005-27 August 2005 and 1 March 2006-13 December 2006)

	n	Pre-Katrina mean value	Post-Katrina mean value	Difference in mean value	Patients with decreased values*	Patients with improved values*	Patients had no change	P for change
Hemoglobin A1c (%)								
TUSC	452	7.5 ± 1.6	7.4 ± 1.6	-0.1 ± 1.4	307 (23.0%)	141 (10.0%)	104 (3.0%)	0.108
VA	748	7.5 ± 1.6	7.4 ± 1.6	-0.2 ± 1.6	522 (50.0%)	192 (25.0%)	134 (17.0%)	0.048
MUSC	180	7.7 ± 1.7	8.1 ± 2.1	0.4 ± 2.8	122 (68.0%)	32 (18.0%)	26 (14.0%)	<0.001
Total	1380	7.6 ± 1.6	7.6 ± 1.6	-0.1 ± 1.5	951 (69.0%)	265 (19.0%)	164 (12.0%)	0.002
Diastolic blood pressure (mmHg)								
TUSC	261	100.0 ± 21.7	107.5 ± 23.8	7.5 ± 20.8	148 (57.0%)	76 (29.0%)	37 (14.0%)	0.008
VA	723	100.7 ± 24.6	103.7 ± 28.4	3.0 ± 20.5	505 (59.0%)	158 (21.8%)	60 (8.3%)	0.001
MUSC	146	110.0 ± 27.7	109.8 ± 26.9	-0.2 ± 12.1	99 (68.0%)	31 (21.0%)	15 (10.0%)	0.004
Total	1129	100.3 ± 27.0	107.0 ± 28.0	6.7 ± 20.4	752 (66.0%)	265 (23.0%)	112 (10.0%)	0.001
Urea nitrogen (mg/dL)								
TUSC	282	7.0 ± 1.0	7.0 ± 1.0	0.0 ± 1.3	113 (40.0%)	91 (32.0%)	78 (28.0%)	0.003
VA	771	8.0 ± 1.0	7.8 ± 1.0	-0.2 ± 1.0	415 (54.0%)	231 (30.0%)	125 (16.0%)	0.367
MUSC	147	7.0 ± 0.7	7.5 ± 1.0	0.5 ± 1.8	61 (41.0%)	52 (35.0%)	34 (23.0%)	0.367
Total	1199	7.7 ± 1.0	7.4 ± 1.0	-0.3 ± 1.1	589 (49.0%)	374 (31.0%)	236 (20.0%)	0.016
LDL cholesterol (mg/dL)								
TUSC	221	165.4 ± 52.6	155.3 ± 50.1	-10.1 ± 54.6	94 (43.0%)	45 (20.0%)	37 (17.0%)	0.001
VA	607	167.4 ± 51.9	166.3 ± 50.2	-1.1 ± 53.7	317 (52.0%)	199 (33.0%)	91 (15.0%)	0.001
MUSC	343	169.0 ± 50.2	167.4 ± 49.4	-1.6 ± 50.8	155 (45.0%)	141 (41.0%)	47 (14.0%)	0.006
Total	1,171	167.4 ± 51.9	166.3 ± 50.2	-1.1 ± 53.7	566 (48.0%)	339 (29.0%)	166 (14.0%)	<0.001
Total cholesterol (mg/dL)								
TUSC	226	168.0 ± 51.6	165.3 ± 49.2	-2.7 ± 52.5	120 (53.0%)	41 (18.0%)	65 (29.0%)	0.004
VA	543	162.1 ± 50.5	162.0 ± 49.4	-0.1 ± 50.6	315 (58.0%)	156 (28.0%)	72 (13.0%)	0.001
MUSC	344	166.0 ± 51.6	164.2 ± 49.6	-1.8 ± 51.0	160 (46.0%)	130 (38.0%)	54 (15.0%)	0.001
Total	1,113	165.4 ± 51.3	164.2 ± 49.6	-1.2 ± 51.0	605 (54.0%)	327 (29.0%)	181 (16.0%)	0.001
Hypoglycemia (mg/dL)								
TUSC	216	176.0 ± 50.0	186.0 ± 50.0	10.0 ± 11.0	96 (44.0%)	103 (48.0%)	17 (8.0%)	0.002
VA	543	172.0 ± 51.0	181.0 ± 50.0	9.0 ± 11.0	296 (54.0%)	247 (45.0%)	60 (11.0%)	0.002
MUSC	346	185.0 ± 51.0	194.0 ± 50.0	9.0 ± 11.0	170 (49.0%)	134 (38.0%)	42 (12.0%)	0.022
Total	1,105	177.0 ± 50.0	187.0 ± 50.0	10.0 ± 11.0	562 (51.0%)	584 (53.0%)	159 (14.0%)	0.001

Note: Mean ± SD or SEM. *% Change from 6 months before patient admission to 6-16 months after patient admission. †% Change from 6 months before patient admission to 6-16 months after patient admission. ‡% Change from 6 months before patient admission to 6-16 months after patient admission. §% Change from 6 months before patient admission to 6-16 months after patient admission. ¶% Change from 6 months before patient admission to 6-16 months after patient admission. ||% Change from 6 months before patient admission to 6-16 months after patient admission. ¶¶% Change from 6 months before patient admission to 6-16 months after patient admission. ¶¶¶% Change from 6 months before patient admission to 6-16 months after patient admission. ¶¶¶¶% Change from 6 months before patient admission to 6-16 months after patient admission. ¶¶¶¶¶% Change from 6 months before patient admission to 6-16 months after patient admission. ¶¶¶¶¶¶% Change from 6 months before patient admission to 6-16 months after patient admission. ¶¶¶¶¶¶¶% Change from 6 months before patient admission to 6-16 months after patient admission. ¶¶¶¶¶¶¶¶% Change from 6 months before patient admission to 6-16 months after patient admission. ¶¶¶¶¶¶¶¶¶% Change from 6 months before patient admission to 6-16 months after patient admission. ¶¶¶¶¶¶¶¶¶¶% Change from 6 months before patient admission to 6-16 months after patient admission. ¶¶¶¶¶¶¶¶¶¶¶% Change from 6 months before patient admission to 6-16 months after patient admission. ¶¶¶¶¶¶¶¶¶¶¶¶% Change from 6 months before patient admission to 6-16 months after patient admission.

Fonseca V. Diabetes Care. 2009;32(9):1632-1638

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Key lessons learned from previous disasters

- Disaster planning/coordinated relief efforts are often insufficient
- Lack of access to medications is the most pressing issue facing patients during/ after a disaster
- Patient (and provider) education and preparedness planning is lacking
- Older adult populations are most vulnerable to declining health after a disaster
- Disaster planning should include psychosocial interventions for patients with chronic diseases

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Preparation is key!

EARLY PLANNING MAY INCREASE THE RESILIENCY OF PEOPLE WITH DIABETES BEFORE, DURING, AND AFTER DISASTERS

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"If you fail to plan, you are planning to fail" - Benjamin Franklin

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Pause and ponder

HOW CAN PHARMACISTS HELP PATIENTS PREPARE FOR NATURAL DISASTERS?



Addressing short-term needs: Access to medication

- BEFORE**
 - Use medication synchronization programs
 - For chronic meds, get 90-day supplies
 - Stockpile 5-14 days worth of meds
 - Invest in watertight containers and coolers for medication storage
- DURING/AFTER**
 - Contact drug plan for extended/emergency supplies
 - Inquire about samples from provider's office
 - Inquire with local community organizations to see what types of supplies have been donated
 - Emergency legislative acts

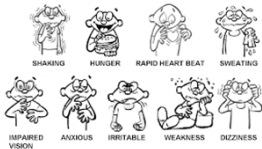


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Addressing short-term needs: Hypoglycemia

SIGNS AND SYMPTOMS



MANAGEMENT
Apply the 15:15 rule

- Check glucose. If ≤ 70 mg/dL...
- Consume 15-20 g of carb (4 oz. or $\frac{1}{2}$ cup of fruit juice, 1 tsp sugar, 3-4 glucose tabs, etc.)
- Recheck glucose 15 minutes later
- Repeat until glucose normalizes

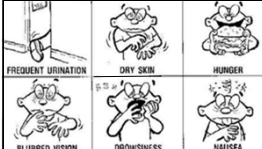
Severe hypoglycemia (< 54 mg/dL) – requires assistance from another person; often cannot be treated with oral carbs due to state of unconsciousness

- Glucagon kit → make sure caregivers & family know how to use

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Addressing short-term needs: Hyperglycemia

SIGNS AND SYMPTOMS



MANAGEMENT
Make sure all patients have a **sick day plan**:


- Test your blood sugar every 2 – 4 hours.
- Continue to take your diabetes medications as prescribed.
- Drink plenty of sugar-free liquids to prevent dehydration.
- Eat your regular meal plan (if possible) to prevent hypoglycemia.
- Check urine ketones if you have type 1 diabetes and/or blood sugars that remain elevated over 250 mg/dL.
- Notify your primary care provider (PCP) that you are sick. Your PCP can provide you additional information about when to seek emergency care and how to safely adjust your medications if needed.

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Addressing short-term needs: Dehydration & infection

DEHYDRATION

- Stay well hydrated
 - Water
 - Sugar-free liquids
- Avoid strenuous activity
- Avoid extreme heat environments



INFECTION RISK

- Make sure vaccines are up-to-date
 - Influenza, pneumococcal, Hepatitis B, and others
- Bathe regularly
- Practice hand and oral hygiene
- Sterilize injection sites/use new needles
- Wear protective shoes and masks

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Addressing short-term needs: Switching between insulin preparations

Clinical scenario	Insulin conversions
NPH → detemir	1:1 conversion given once daily
NPH → glargine U-100, glargine U-300, degludec	Once daily NPH: 1:1 conversion given once daily Twice daily NPH: 80% of TDD given once daily
Glargine ↔ detemir	1:1 conversion
Glargine U-100 OR detemir → glargine U-300 OR degludec U-100 or U-200	1:1 conversion given once daily
Glargine U-100 OR detemir → NPH	1:1 conversion; give NPH twice a day Can consider 20% dose reduction to be conservative
Rapid OR short acting ↔ short OR rapid acting	1:1 conversion; watch for meal timing

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Addressing short-term needs: Insulin storage


- Insulin be stored in a refrigerator at approximately 36°F to 46°F
- Most insulin products contained in vials supplied by the manufacturers (opened or unopened) may be left unrefrigerated at a temperature between 59°F and 86°F for up to **28 days** and continue to work (See **supplemental insulin handout**)
 - An insulin product that has been altered for the purpose of dilution or by removal from the manufacturer's original vial should be discarded within two weeks
- Insulin loses some effectiveness when exposed to extreme temperatures
 - Under emergency conditions, you might still need to use insulin that has been stored above 86°F
 - Do not use** insulin that has been frozen
- Keep insulin away from direct heat and out of direct sunlight




Available at: www.fda.gov/drugs/emergency-preparedness-drugs/information-regarding-insulin-storage-and-switching-between-products-emergency

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Addressing long-term needs




Infrastructure changes



Community resources



Formation of medical volunteer teams



Continued education and training

Satoh, J. *Diabetes Investig.* 2019;10:1118-1142
Alhewiss P. *Diabetes Manage.* 2011;1(4):369-377

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Addressing long-term needs: Infrastructure

- Create flexible drug-dispensing policies
- Build partnerships among key stakeholders
- Investment in facilities, utilities, & communication networks
- Manage increased demand for healthcare workers
- Enhance patient follow-up and outreach

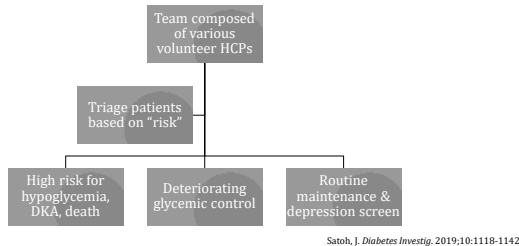
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Addressing long-term needs: Community resources

- Patients with special needs should register with their respective towns/cities if possible
- Town webpages provide local information on shelters, locations for showering, charging stations, internet access, water, food pantries, and more
- State/government webpages provide information on how to prepare for emergencies
- Shelter information available at: <https://www.redcross.org/get-help/disaster-relief-and-recovery-services/find-an-open-shelter.html>
- 1-800-DIABETES for patient support and information
- 1-314-INSULIN for providers to request support or report supply shortages
- 1-800-985-5990 for the Disaster Distress Hotline

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Addressing long-term needs: Volunteer groups



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Addressing long-term needs: Continuing education & training

- Continued education programs for health care providers
- Competency requirements for CDE training programs
- Integration of emergency planning into DSME curricula
- Develop training manuals for healthcare facilities

Satoh, J. *Diabetes Investig.* 2019;10:1118-1142
Allweiss P. *Diabetes Manage.* 2011;1(4):369-377

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Pause and ponder

BASED ON YOUR EXPERIENCE(S), WHAT ARE OTHER WAYS
DISASTER PLANNING & RELIEF EFFORTS CAN BE IMPROVED?



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Developing an emergency preparedness care plan

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Disaster Preparedness for patients

1. Obtain good diabetes education that emphasizes self-management skills and stresses management
2. Be up to date with all immunizations, including tetanus
3. Keep a waterproof and insulated **disaster kit** ready with:
 - Glucometer, test strips, and lancets
 - Medications, including insulin, syringes, and/or pen needles
 - Glucose tabs or quick source of sugar
 - Glucagon emergency kit
 - Prepared snacks
 - Ketone strips
 - Antibiotic ointments or creams (e.g., first aid kit)



Diabetes Care. 2007; 30(9): 2395-2398

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Disaster Preparedness cont.

- Up-to-date, active medication list including doses and directions
 - Photocopies of relevant medical information, particularly recent lab tests/procedures, if available
 - List of contacts for local and/or national organizations / resources (See previous slides)
4. Evacuate early, if possible, taking the items listed above with you.



Diabetes Care. 2007; 30(9): 2395-2398

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Other emergency preparedness considerations

Wear protective clothing and wear sturdy shoes

Stay well hydrated and avoid excessive outdoor activity in the heat

Increase food and water intake during periods of increased exertion or physical activity

Avoid periods of hunger and overindulgence

Know nutrition options that will be useful in a disaster

Diabetes Disaster Response Coalition

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Snack & food options

- Large box of unopened crackers
- One jar of peanut butter
- One small box of powdered milk
- One gallon of water per day
- Two packages of cheese and crackers or one jar of soft cheese
- One package dry unsweetened cereal or single serving boxes
- Six cans of sugar-free soda
- Six pack of canned fruit juice or sports drink
- Cans of tuna, salmon, chicken and nuts
- Can opener



Diabetes Disaster Response Coalition

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Summary

- Patients with diabetes are at increased risk of complications from natural disasters
- The impact will be determined by a variety of factors
- Proper planning helps patients build self-efficacy and resilience
- Pharmacists can help educate patients and build preparedness plans
- Greater efforts are needed for improving the infrastructure/coordinating relief efforts

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Additional resources

- Lilly: 1-800-545-5979
 - Sanofi-Aventis: 1-800-633-1610
 - Novo Nordisk: 1-800-727-6500
 - Omnipod: 1-800-591-3455
 - Dexcom: 1-888-738-3646
 - Medtronic: 1-800-633-8766
- } Insulin manufacturers
- } Insulin pump manufacturers
- Diabetes Disaster Response Coalition: 1-765-314-3372 or <https://diabetesdisasterresponse.org>
 - Centers for Disease Control and Prevention (CDC): <https://www.cdc.gov/diabetes/managing/preparedness.html>

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Dealing with Diabetes During Disasters

FEEL FREE TO EMAIL ANY QUESTIONS TO:

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