

Chronic Disease and Disasters

Medication Demands of Hurricane Katrina Evacuees

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Background: Preparing for natural disasters has historically focused on treatment for acute injuries, environmental exposures, and infectious diseases. Many disaster survivors also have existing chronic illness, which may be worsened by post-disaster conditions. The relationship between actual medication demands and medical relief pharmaceutical supplies was assessed in a population of 18,000 evacuees relocated to San Antonio TX after Hurricane Katrina struck the Gulf Coast in August 2005.

Methods: Healthcare encounters from day 4 to day 31 after landfall were monitored using a syndromic surveillance system based on patient chief complaint. Medication-dispensing records were collected from federal disaster relief teams and local retail pharmacies serving evacuees. Medications dispensed to evacuees during this period were quantified into defined daily doses and classified as acute or chronic, based on their primary indications.

Results: Of 4229 categorized healthcare encounters, 634 (15%) were for care of chronic medical conditions. Sixty-eight percent of all medications dispensed to evacuees were for treatment of chronic diseases. Cardiovascular medications (39%) were most commonly dispensed to evacuees. Thirty-eight percent of medication doses dispensed by federal relief teams were for chronic care, compared to 73% of doses dispensed by retail pharmacies. Federal disaster relief teams supplied 9% of all chronic care medicines dispensed.

Conclusions: A substantial demand for drugs used to treat chronic medical conditions was identified among San Antonio evacuees, as was a reliance on retail pharmacy supplies to meet this demand. Medical relief pharmacy supplies did not consistently reflect the actual demands of evacuees. (Am J Prev Med 2007;33(3):207-210) © 2007 American Journal of Preventive Medicine

Introduction

On August 29, 2005, Hurricane Katrina struck the Gulf Coast, forcing the relocation of more than 18,000 Louisiana and Mississippi residents into mass evacuee centers in San Antonio, TX. Disaster-related morbidity from acute traumatic injuries, environmental exposures, and infectious diseases was expected, and medical relief plans focused on these well-recognized consequences of natural disasters.¹ Although survivor needs are likely incident specific, recent evidence suggests that post-disaster medical care

often involves few patients with acute conditions^{2,3} and many patients with low-acuity complaints.⁴⁻⁶

In this report, disease surveillance and pharmaceutical use data from a group of displaced Hurricane Katrina survivors are presented. These data describe the survivors' medication requirements and the extent to which these needs were met by federal disaster relief teams and local retail pharmacies.

Methods

The primary outcomes of interest for this ecological study were medications dispensed to Hurricane Katrina evacuees residing in a San Antonio evacuee center from September 2nd through the 21st, 2005. During this period, the Centers for Disease Control and Prevention assisted the San Antonio Metropolitan Health District with disease surveillance in four primary evacuee centers. Health care was provided to evacuees in one evacuee center by the Texas-1 and Florida-2 disaster medical assistance teams (DMATs) and in three evacuee centers by local clinicians. Evacuees obtained prescription and over-the-counter medications either from the DMAT pharmacy cache or from one of four retail pharmacies that had established dispensing centers located inside evacuee centers or in mobile trailers immediately adjacent to them. These centers dispensed only to evacuees

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Table 1. Medications dispensed to Hurricane Katrina evacuees, San Antonio TX, September 2–21, 2005

Drug category	Drug category contents	^a Doses dispensed by DMAT (n=14,719)	^a Doses dispensed by retail (n=80,424)	Ratio of retail/DMAT doses dispensed
Acute		9119 (62%)	21,292 (27%)	2.3
Allergy/cough and cold	Antihistamines, decongestants, expectorants, cough suppressants	2459	1495	0.61
Anti-infective	Antibiotics, antivirals, antifungals	4495	2995	0.67
Anti-inflammatory	NSAIDs, COX-IIs, steroids	1275	6033	4.7
Gastrointestinal	Antiemetics, laxatives, antidiarrheals, antiulcer	445	3830	8.6
Analgesic	Aspirin, acetaminophen, opioids, muscle relaxants	383	3596	9.4
Neuropsychotropic	Benzodiazepines, barbiturates, sedative-hypnotics	62	3343	54
Chronic		5600 (38%)	59,132 (73%)	10.6
Respiratory	β agonists, inhaled steroids, leukotriene inhibitors, xanthine derivatives, inhaled anticholinergics	3511 ^b	5312 ^b	1.5
Cardiovascular	Antihypertensives, anti-arrhythmics, antihyperlipidemics	1693	35,454	20.9
Neuropsychotropic	Antidepressants, antipsychotics, antiepileptics	195	8733	44.8
Endocrine	Insulin, oral hypoglycemics, thyroid replacements	201	9633	47.9

^aDose information is listed in defined daily doses.

^bThis number includes albuterol (1888 DMAT/2822 retail), which was considered a medication used for treating chronic respiratory disease in this study.

DMAT, disaster medical assistance teams; retail, retail pharmacy dispensing centers at evacuation centers; NSAID, nonsteroidal anti-inflammatory drugs; COX, cyclooxygenase.

residing in evacuee centers with a written prescription from a DMAT or local care provider and were the primary source for all evacuee medications. Medication use by evacuees was measured by analyzing all DMAT and all available retail pharmacy records.⁴

Evacuee chief complaints were entered into the surveillance system by care providers after treatment at evacuee centers. Chief complaints were assigned a disease syndrome category using a computer algorithm developed by the New York City Department of Health and Mental Hygiene for syndromic surveillance.⁷ Each healthcare encounter was then classified into an “acute” or “chronic” disease category.

Medication use was quantified using defined daily doses (DDD). DDDs were calculated based on World Health Organization Anatomical Therapeutic Chemical/DDD methodology⁸ and represent the average maintenance daily dose for a drug used for its main indication. Medications were categorized into “acute” or “chronic” classes based on their primary Anatomical Therapeutic Chemical/DDD indication or their American Hospital Formulary Service (AHFS) pharmacologic-therapeutic classification.⁹

Results

Daily evacuee census ranged from 2020 to 6219 people (median = 3707). The median number of healthcare encounters per day was 218 (5% of evacuee popula-

tion), with a range of 5 to 574 encounters (<1% to 13% of evacuee population). Of 5030 evacuee healthcare encounters captured by the syndromic surveillance system, 4229 (84%) were categorized;^b 2834 (67%) were for acute care conditions, 634 (15%) were explicitly for care of chronic medical conditions, and 761 (18%) were for routine care, including dressing changes, immunizations, and medication refills.

The DMAT pharmacy dispensed 2705 prescriptions (14,719 DDDs) to hurricane evacuees; retail pharmacies dispensed 19,300 prescriptions, of which 11% (2081 prescriptions, 80,424 DDDs) were available for further analysis.

Thirty-eight percent of DDDs dispensed by the DMAT pharmacy were classified as chronic care medicines; 73% of doses provided by the retail pharmacies were for chronic care (Table 1). Cardiovascular medications (39%) were the most commonly dispensed of all DDDs. The most commonly dispensed drugs from the DMAT pharmacy were amoxicillin (3500 DDDs), albuterol (1888 DDDs), and ibuprofen (805 DDDs). The most commonly dispensed drugs from the retail pharmacy centers were insulin (5275 DDDs), hydrochlorothiazide (5047 DDDs), and simvastatin (4118 DDDs). For some therapeutic categories (e.g., antihypertensives, antidepressants, antiretrovirals), retail pharmacies dis-

^aAlthough dispensing information was requested from all four retail dispensing centers, only two of the four retail pharmacies supplied detailed records for analysis.

^bEight hundred one encounters were not categorized because chief complaint data was either missing, illegible, or unspecified.

Table 2. Number of defined daily doses dispensed to Hurricane Katrina evacuees, San Antonio TX September 2–21, 2005 for selected medication classes

Medication class	Number DDD in DMAT cache	Percent of DMAT cache DDD dispensed	Number DDD dispensed by retail
Antihypertensive	905	98%	24,779
Diuretics (thiazide, loop)	307	100%	7596
ACEIs	269	100%	6896
CCBs	200	100%	3515
BBs	129	73%	2572
ARBs	0	–	1708
Diuretic-ACEIs/ARB comb	0	–	390
Antiretroviral	60	0%	1503
PIs	30	0%	355
NARTIs	30	0%	938
NNRTIs	0	–	210
Antidepressant	167	75%	5012
SSRIs	100	100%	3383
TCAs	67	18%	779
Bupropion	0	–	280
Other ^a	0	–	570
Insulin	28	100%	5275

^aMirtazapine, nefazodone, trazodone, venlafaxine. ACEIs, angiotensin-converting enzyme inhibitors; ARBs, angiotensin II receptor blockers; BBs, β blockers; CCBs, calcium channel blockers; comb, combination agents; PIs, protease inhibitors; NARTIs, nucleoside analog reverse transcriptase inhibitors; NNRTIs, non-nucleoside reverse transcriptase inhibitors; SSRIs, selective serotonin reuptake inhibitors; TCAs, tricyclic antidepressants; DDD, defined daily dose; DMAT, disaster medical assistance team; retail, retail pharmacy dispensing centers at evacuation centers.

pensed substantially higher quantities of medications than the DMAT pharmacy (Table 2).

Conclusion

Hurricane evacuees in San Antonio relied on retail pharmacies to meet the majority of their medication needs. Although evacuees seeking care for chronic medical complaints accounted for relatively few health-care encounters (15%), their medication needs constituted 68% of all DDDs dispensed. The DMATs deployed to San Antonio appeared better equipped to meet the acute care medication needs of evacuees than their chronic medication demands. The DMAT pharmacy dispensed fewer doses per prescription (mean 5.4 DDDs) than retail pharmacies (38.7 DDDs), in part reflecting the DMAT's traditional rescue and stabilization roles in disaster relief efforts. Specific medications unavailable in the DMAT pharmacy were also in demand by evacuees (although the DMAT cache contained other medications for the same indication that went unused). This was particularly true for chronic ailments, such as depression and HIV, for which preferred pharmaceutical treatment is highly patient-specific and subject to change when new agents be-

come available.^{10,11} For example, selective serotonin reuptake inhibitors, which are more commonly prescribed for patients with chronic depression than tricyclic antidepressants,^{12,13} made up the majority (67%) of antidepressant DDDs dispensed to evacuees, yet constituted only 60% of the DMAT antidepressant pharmacy cache brought to San Antonio. Conversely, tricyclic antidepressants constituted 40% of the DMAT cache but accounted for only 15% of all antidepressants dispensed to evacuees. These findings substantiate reports based on injury and illness surveillance that estimate a considerable demand for chronic disease treatment among hurricane survivors in the United States.^{14–17}

This study is subject to several limitations. First, only 11% of retail pharmacy prescriptions were available for complete analysis, and the DMAT pharmacy dispensed primarily to one evacuee center. Although there is no reason to suspect these are biased samples, they may not be representative of prescriptions dispensed to all hurricane evacuees. Second, no validated method exists to categorize medications exclusively into acute and chronic classes; certain medications may be used to treat both chronic and acute conditions. Nonetheless, Anatomical Therapeutic Chemical/DDD and AHFS methodologies were applied in a consistent manner, and there were few instances for which therapeutic intent was equivocal. Finally, without patient outcome data, the impact DMAT medication supplies had on evacuee care was not assessable. However, this was not the primary objective of the study. Instead, the data provide an indication that the chronic medication demands of disaster survivors may be greater than and different from the supply available from DMAT pharmacy supplies alone.

Chronic illness in disaster survivors can be exacerbated by exposure to temperature extremes, lack of food or water, and physical and emotional trauma. At greatest risk may be those with mental illnesses or disabilities, people of low socioeconomic status and individuals who lack regular access to health care.^{18,19} Many of these people may be placed into evacuee centers following disasters, where their medical conditions will be managed by relief teams.

This study suggests that exacerbation of chronic medical conditions may contribute substantially to the public health burden of disasters. It also demonstrates that monitoring pharmaceutical use among evacuees can be combined with traditional disease surveillance to help clarify public health priorities after disasters. The findings support an emerging shift in disaster preparedness efforts away from a “one-plan-fits-all” approach toward a collection of more flexible plans that can be tailored to a wide range of circumstances, hazards, and survivors.^{20,21} This approach recognizes that relief teams may not only be providers of medical care but also may be tasked with providing some

services ordinarily delivered by community clinics and pharmacies.^{22,23} Regardless of the approach, addressing chronic disease needs in disaster medicine is a critical component of preparedness efforts, especially for incidents during which a large number of evacuees are displaced for extended periods of time.

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