Utilization of Mental Health Services by Children Displaced by Hurricane Katrina

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Objective: This study examined changes in utilization of mental health services after Hurricane Katrina among children with preexisting conditions who were displaced from their homes in Louisiana disaster counties and resettled in Texas.

Methods: A retrospective analysis was performed on Medicaid claims data for 101,950 children from 2004 to 2006. Pre-post changes in utilization of mental health services by the displaced children and three control groups were compared. The control groups were children from Louisiana disaster counties who were not displaced, Louisiana children from nondisaster counties, and Texas children enrolled in Medicaid.

Results: The proportion of children who had a prescription fill for psychotropic medication and the average days' supply per child decreased in each group, but the decreases were significantly larger for the displaced group than for the control groups. The decreases in both measures were largest for stimulants and antidepressants, the two most common medication classes. By contrast, changes in the proportion of children with an encounter involving psychiatric services and the average number of psychiatric services encounters per child did not vary systematically across the displaced and control groups.

Conclusions: The contrast between the results for medication utilization and encounters reveals a potential gap in post-Katrina provision of care. Although the findings for encounters indicate that, on average, displaced children did not experience a disruption in provider visits, the medication estimates suggest that they often did not obtain pharmaceutical treatment. Future disaster responses may be improved by addressing logistical impediments faced by disaster victims in filling their prescriptions for psychiatric medications.

Psychiatric Services 2018; 69:580–586; doi: 10.1176/appi.ps.201700281

Disasters have been found to lead to greater utilization of mental health services by adults. Terrorist attacks (1–3), hurricanes (4–8), and other natural disasters (9) have been associated with increased use of mental health services and medications by adults in the months after the disaster. Disasters are also associated with increases in the prevalence (10–13) and worsening (14,15) of preexisting conditions.

However, relatively little is known regarding the effects of disasters on the utilization of mental health services among children. Because children rely on adults, it is possible that the mental health needs of children go unmet in these situations, given that the adults are dealing with the stress and challenges of recovering from the disaster. Furthermore, previous studies have found that children react differently to disasters than adults. Among children, mental health status appears to be linked to anxiety about the event, whereas mental health status among adults is related to their exposure (16). This suggests that children may be more likely to develop posttraumatic stress symptoms rather than symptoms of major depression or generalized anxiety disorder (14).

This study investigated postdisaster mental health utilization by children whose families were affected by Hurricane Katrina. The 2005 storm was responsible for roughly 1,200 deaths and $108 billion in damages (17). Approximately 1.5 million people in the Gulf of Mexico region were forced to evacuate (18). In response to the mass displacement, 17 states issued emergency Medicaid waivers that provided short-term health insurance to low-income evacuees (19). The largest such waiver was TexKat, which covered almost 60,000 individuals and provided a maximum of six months of care from September 2005 to June 2006 (20).

This study investigated utilization of mental health services by children with preexisting, chronic mental health conditions who were displaced to Texas by Hurricane Katrina. The analysis consisted of a pre-post retrospective study of Medicaid claims data. Utilization by the displaced children was compared with that of three multiple plausible control groups—two groups of Louisiana children who were not displaced and children who lived in Texas. On the basis of findings among adults, we anticipated that utilization of both mental health services and medications increased among children.

METHODS

Data

Individual-level Medicaid Analytic Extract (MAX) claims data for 2004–2006 were employed in the analysis. The data contained both enrollment and encounter information. The sample initially consisted of children who were ages 18 or younger at the time Hurricane Katrina struck. It was then limited to children who had a claim from January 2004 through December 2004 that included a diagnosis for psychiatric conditions that are relatively chronic, require long-term treatment, and are unlikely to go into remission even in the presence of treatment. By focusing on these conditions, it was possible to isolate the effects of displacement on utilization and prevent the estimates from being confounded by utilization changes due to remission. The conditions analyzed were bipolar disorder (*ICD-9* codes 296.0, 296.4–.6, and 296.80), other nonorganic psychoses (298), pervasive developmental disorders (299), posttraumatic stress disorder (PTSD) (309.81), disturbance of conduct not elsewhere classified (NEC) (312), hyperkinetic syndrome of childhood (314), schizophrenia (295), and depression (296.2, 296.3, 300.4, and 311).

The sample was further limited to children who qualified for the TexKat or control groups based partly on zip code information contained in the enrollment data. The TexKat group consisted of children who lived in a county designated as a disaster county by the Federal Emergency Management Agency (21), were displaced to Texas following Katrina, and were enrolled in TexKat for at least one month. Three control groups were created to isolate the effects of displacement. The control group labeled LA-disaster consisted of children who lived in a Louisiana disaster zip code prior to Katrina but did not relocate to Texas. The second control group, LA-nondisaster, also consisted of Louisiana children who did not relocate to Texas but who lived in a county that was not declared a disaster area. The last group, TX, comprised children who were enrolled in Texas Medicaid. The final sample included 101,950 children.

The preperiod was January 2005–June 2005 (2005 H1), and the postperiod was January 2006–June 2006 (2006 H1). The study excluded the July–December periods because the data in the second half of 2005 were unreliable as a result of the immediate impact and disruption of Katrina. To minimize the potential for not observing treatment provided outside of Medicaid, the sample was limited to children who were enrolled in Medicaid for each of the preperiod and postperiod months.

The outcomes of interest included psychiatric medication and mental health service utilization. Because the claims data report filled prescriptions, the two medication outcomes were based on fill measures: the proportion of children with at least one filled prescription and the average number of days' supply per child (22). The relevant drugs were identified based on the 2006 Texas Health and Human Services Commission drug formulary (23) listing of psychotropic drugs; the National Drug Code for each was obtained from Truveen Health Analytic's RED BOOK database (24).

Encounters were measured by the proportion of children with at least one encounter and the mean number of encounters per child. Encounters were included in the sample if they contained one of the relevant *ICD-9* diagnosis codes and were labeled as one of the following types: psychiatric services, physician office, emergency department, and inpatient hospital. Psychiatric services encounters were defined as encounters with 53 as the MAX type-of-service code (psychiatric services excluding adult day care) and comprised outpatient psychotherapeutic services not provided by a physician. Physician office encounters were identified by MAX type-of-service code 8 (physicians) and place-of-service code 11 (office) and included services such as diagnosis, medication management, and care of comorbid conditions. Emergency department encounters were identified as encounters with place-of-service code 23 (emergency room–hospital) and inpatient encounters as those with MAX type-of-service code 1 (inpatient hospital).

Analyses

Pre-post inferential tests that compared changes in the utilization measures between the TexKat and control groups were performed. The medication analysis compared outcomes by all drugs and by drug class (stimulants, antidepressants, mood stabilizers, antipsychotics, sedative hypnotics, anxiolytics, and miscellaneous). The encounter analysis was performed by encounter type.

The analysis was performed in Stata, version 14.1 (25). Approval for this study was received from the University of South Florida Institutional Review Board.

RESULTS

Table 1 summarizes the demographic and diagnostic characteristics of the TexKat and control groups. The groups had a similar gender composition, with females accounting for roughly 30% of members. Likewise, the age distributions were similar, in that roughly two-thirds of the children in each group were between the ages of 10 and 18. However, the racial-ethnic composition of the groups differed considerably. Whereas black children accounted for more than 90% of the TexKat group, they comprised less than half of the two LA groups and less than one-quarter of the TX group. To account for this discrepancy, in addition to the analyses of all children in the groups, another set of analyses was performed that limited the samples to black children. The results were largely unchanged. [Tables summarizing the results of the analyses with only black children are available as an online supplement to this article.]

The percentage of children with hyperkinetic syndrome of childhood ranged from approximately 70% to 80% across the four groups. Two notable contrasts across the groups were the relatively high percentages of children with

TABLE 1. Demographic and diagnostic characteristics of 101,950 children in the TexKat group or a control group

			Control group					
	TexKat (N=536)[a]		LA-disaster (N=26,097)[b]		LA-nondisaster (N=16,028)[c]		TX (N=59,289)[d]	
Characteristic	N	%	N	%	N	%	N	%
Gender								
Female	165	30.8	8,033	30.8	5,007	31.2	20,113	33.9
Male	371	69.2	18,062	69.2	11,020	68.8	39,176	66.1
Unknown	0	–	2	.0	1	.0	0	–
Age								
0–4	7	1.3	409	1.6	313	2.0	1,893	3.2
5–9	176	32.8	7,592	29.1	4,660	29.1	18,483	31.2
10–14	237	44.2	11,854	45.4	7,293	45.5	25,028	42.2
15–18	116	21.6	6,242	23.9	3,762	23.5	13,885	23.4
Race-ethnicity								
Black	496	92.5	11,545	44.2	6,695	41.8	12,144	20.5
White	24	4.5	13,130	50.3	8,319	51.9	17,536	29.6
Hispanic	11	2.1	84	.3	94	.6	27,484	46.4
Asian	2	.4	26	.1	24	.1	131	.2
Other	3	.6	1,312	5.0	896	5.6	1,994	3.4
Diagnosis								
Bipolar disorder	18	3.4	841	3.2	349	2.2	5,865	9.9
Other nonorganic psychoses	17	3.2	582	2.2	329	2.1	1,413	2.4
Pervasive developmental disorder	17	3.2	868	3.3	508	3.2	2,880	4.9
PTSD	10	1.9	195	.7	169	1.1	3,578	6.0
Disturbance of conduct not elsewhere classified	113	21.1	3,471	13.3	2,034	12.7	9,045	15.3
Hyperkinetic syndrome of childhood	392	73.1	21,285	81.6	12,796	79.8	41,600	70.2
Schizophrenia	4	.7	215	.8	109	.7	619	1.0
Depression	75	14.0	3,732	14.3	2,438	15.2	15,412	26.0

[a] Children who lived in a county designated as a disaster county by the Federal Emergency Management Agency following Hurricane Katrina, were displaced to Texas, and were enrolled in the TexKat Medicaid waiver program for at least one month
[b] Children who lived in a Louisiana disaster zip code prior to Katrina but did not relocate to Texas
[c] Children from Louisiana who lived in a county that was not declared a disaster area following Katrina and did not relocate to Texas
[d] Children who were enrolled in Texas Medicaid

disturbance of conduct NEC in the TexKat group and with depression in the TX group.

Medications

The proportions of children who had at least one filled prescription are reported in Table 2. The proportions of children who had a filled prescription in 2005 H1 were relatively similar across the TexKat and control groups in each class. For the vast majority of medication classes, the proportion of children in each group who had a filled prescription was smaller in 2006 H1 than in 2005 H1, likely reflecting general treatment attrition (26). However, the decreases in 2006 H1 were generally significantly larger for the TexKat group. The proportion of children with a fill for all medications, as a group, dropped from 50% to 300% more in the TexKat group than in the control groups, with p values of .001 or less. This pattern was present for stimulants, antidepressants, mood stabilizers, and antipsychotics. The proportion of TexKat children who had a filled prescription for an antidepressant fell by over 60% in 2006 H1. Antidepressant usage was relatively widespread across diagnoses, with the proportion of children with a filled antidepressant prescription ranging from 12% for children with hyperkinetic syndrome to 50% for children with schizophrenia.

Table 3 reports medication utilization by days' supply. From 2005 H1 to 2006 H1, the days' supply of all medications combined decreased in each group, but the decrease for the TexKat group was significantly larger. The decrease in days' supply was approximately two to four times as large in the TexKat group compared with the decreases in the control groups, and the differences were all statistically significant. As was the case for the proportions of children who had a prescription filled for stimulants and antidepressants, the days' supply of stimulants and antidepressants in 2005 H1 was smaller in the TexKat group compared with the two LA control groups, but the drop in days' supply between 2005 H1 and 2006 H1 was larger. The results by medication class were relatively consistent with those in Table 2, except the decrease in days' supply of mood stabilizers between the TexKat and the LA-disaster and TX groups was not statistically significantly different.

Encounters

Table 4 features the proportion of children in each group who had at least one encounter. A different picture emerged for encounters relative to medications. For the TexKat group, the drop in psychiatric services was smaller than for the two LA groups, albeit not statistically significantly smaller. Furthermore, the proportions of children who had an encounter involving psychiatric services in 2005 H1 and 2006 H1 were much greater in the TX group than in the other groups. By contrast, the proportion of children who received physician office visits decreased significantly more in the TexKat group compared with the control groups. The mean number of encounters per child are shown in Table 5. The mean number of encounters per child for psychiatric services between 2005 H1 and 2005 H2 rose for all groups, but the increase was significantly smaller in the TexKat group compared with the LA-nondisaster and TX groups. Physician office encounters dropped significantly more in the TexKat group than in the control groups.

TABLE 2. Change in the proportion of children in the TexKat and control groups with at least one filled prescription for a psychotropic medication between January 2005–June 2005 (2005 H1) and January 2006–June 2006 (2006 H1)

				Control group											
	TexKat (N=536)[a]			LA-disaster (N=26,097)[b]				LA-nondisaster (N=16,028)[c]				TX (N=59,289)[d]			
Medication class	2005 H1	2006 H1	Change	2005 H1	2006 H1	Change	p[e]	2005 H1	2006 H1	Change	p[f]	2005 H1	2006 H1	Change	p[g]
All	.578	.384	−.194	.668	.545	−.123	<.001	.630	.534	−.095	.001	.645	.586	−.058	<.001
Stimulants	.424	.291	−.132	.496	.402	−.094	.050	.452	.379	−.073	.001	.423	.370	−.052	<.001
Antidepressants	.147	.054	−.093	.147	.110	−.037	<.001	.155	.128	−.027	<.001	.197	.172	−.025	<.001
Mood stabilizers	.104	.071	−.034	.086	.078	−.008	.020	.074	.070	−.004	.004	.149	.146	−.003	.015
Antipsychotics	.073	.041	−.032	.060	.049	−.011	.027	.066	.058	−.008	.019	.145	.151	.006	.004
Sedative hypnotics	.049	.032	−.017	.052	.046	−.006	.367	.054	.047	−.006	.374	.086	.077	−.009	.580
Anxiolytics	.015	.011	−.004	.017	.017	−.001	.631	.014	.013	−.001	.678	.024	.026	.003	.393
Miscellaneous	.069	.065	−.004	.091	.083	−.008	.714	.078	.074	−.004	.974	.103	.100	−.003	.982

[a] Children who lived in a county designated as a disaster county by the Federal Emergency Management Agency following Hurricane Katrina, were displaced to Texas, and were enrolled in the TexKat Medicaid waiver program for at least one month
[b] Children who lived in a Louisiana disaster zip code prior to Katrina but did not relocate to Texas
[c] Children from Louisiana who lived in a county that was not declared a disaster area following Katrina and did not relocate to Texas
[d] Children who were enrolled in Texas Medicaid
[e] Compared with the change in proportions for the TexKat group, df=26,631
[f] Compared with the change in proportions for the TexKat group, df=16,562
[g] Compared with the change in proportions for the TexKat group, df=59,823

DISCUSSION

The results indicated that many children with preexisting mental health conditions who were displaced by Katrina may have suffered a disruption in their medication treatments. Both in terms of the proportion of children with a filled prescription and average days' supply, the TexKat group experienced significantly larger drops than the control groups. Both the proportion of children who had at least one prescription filled of any medication and the average days' supply fell by roughly a third. Furthermore, for stimulants and antidepressants— the two largest drug classes—the decreases in both measures were larger for the TexKat group than for the control groups.

However, an interesting divergence emerged in the findings for encounters. Between 2005 H1 and 2006 H1, the decrease in the proportion of children in the TexKat group who used psychiatric services was nominally less than the

TABLE 3. Change in the mean days' supply of psychotropic medication among children in the TexKat and control groups between January 2005–June 2005 (2005 H1) and January 2006–June 2006 (2006 H1), by medication class

				Control group											
	TexKat (N=536)[a]			LA-disaster (N=26,097)[b]				LA-nondisaster (N=16,028)[c]				TX (N=59,289)[d]			
Medication class	2005 H1	2006 H1	Change	2005 H1	2006 H1	Change	p[e]	2005 H1	2006 H1	Change	p[f]	2005 H1	2006 H1	Change	p[g]
All	105.8	63.0	−42.8	122.6	100.1	−22.5	<.001	114.3	101.0	−13.3	<.001	163.5	150.4	−13.0	<.001
Stimulants	45.9	28.1	−17.8	61.6	50.3	−11.3	.019	55.7	48.5	−7.2	<.001	54.2	48.1	−6.1	<.001
Antidepressants	15.1	5.0	−10.1	15.5	11.6	−3.9	<.001	17.0	13.8	−3.2	<.001	23.8	20.7	−3.1	.001
Mood stabilizers	11.3	8.3	−3.0	10.5	9.3	−1.2	.188	9.4	9.4	.0	.030	22.0	21.5	−.5	.204
Antipsychotics	10.2	5.7	−4.5	7.1	5.9	−1.2	.007	8.0	7.3	−.7	.005	20.8	21.7	.9	.008
Sedative hypnotics	2.9	1.7	−1.2	2.5	2.3	−.2	.187	2.5	2.3	−.2	.147	7.2	6.6	−.7	.680
Anxiolytics	.8	.9	.1	1.2	1.1	−.1	.737	.9	.8	−.1	.641	1.9	2.1	.2	.839
Miscellaneous	6.9	5.8	−1.1	10.2	9.5	−.6	.713	9.0	8.8	−.2	.453	12.6	12.5	−.1	.481

[a] Children who lived in a county designated as a disaster county by the Federal Emergency Management Agency following Hurricane Katrina, were displaced to Texas, and were enrolled in the TexKat Medicaid waiver program for at least one month
[b] Children who lived in a Louisiana disaster zip code prior to Katrina but did not relocate to Texas
[c] Children from Louisiana who lived in a county that was not declared a disaster area following Katrina and did not relocate to Texas
[d] Children who were enrolled in Texas Medicaid
[e] Compared with the change in proportions for the TexKat group, df=26,631
[f] Compared with the change in proportions for the TexKat group, df=16,562
[g] Compared with the change in proportions for the TexKat group, df=59,823

TABLE 4. Change in the proportion of children in the TexKat and control groups who had at least one encounter between January 2005–June 2005 (2005 H1) and January 2006–June 2006 (2006 H1)

				Control group											
	TexKat (N=536)[a]			LA-disaster (N=26,097)[b]				LA-nondisaster (N=16,028)[c]				TX (N=59,289)[d]			
Encounter type	2005 H1	2006 H1	Change	2005 H1	2006 H1	Change	p[e]	2005 H1	2006 H1	Change	p[f]	2005 H1	2006 H1	Change	p[g]
Psychiatric services	.201	.162	−.039	.170	.120	−.050	.533	.217	.159	−.057	.319	.547	.543	−.004	.103
Physician office	.351	.157	−.194	.430	.353	−.077	<.001	.411	.336	−.075	<.001	.168	.149	−.019	<.001
Emergency department	.028	.030	.002	.024	.023	−.001	.710	.027	.024	−.002	.666	.020	.020	.000	.796
Inpatient	.028	.017	−.011	.020	.018	−.001	.222	.024	.024	.000	.203	.034	.034	.000	.284

[a] Children who lived in a county designated as a disaster county by the Federal Emergency Management Agency following Hurricane Katrina, were displaced to Texas, and were enrolled in the TexKat Medicaid waiver program for at least one month
[b] Children who lived in a Louisiana disaster zip code prior to Katrina but did not relocate to Texas
[c] Children from Louisiana who lived in a county that was not declared a disaster area following Katrina and did not relocate to Texas
[d] Children who were enrolled in Texas Medicaid
[e] Compared with the change in proportions for the TexKat group, df=26,631
[f] Compared with the change in proportions for the TexKat group, df=16,562
[g] Compared with the change in proportions for the TexKat group, df=59,823

decrease in the LA groups and was similar to the decrease in the TX group. The mean number of encounters for this type increased for the TexKat group from 2005 H1 to 2006 H1. By contrast, the mean number of physician office encounters decreased for the TexKat group, and the decrease was greater than for the control groups.

Potential explanations for our results other than Hurricane Katrina were investigated. One possible cause was differences in drug coverage between Medicaid in Louisiana and Texas. For instance, higher copayments in Texas relative to Louisiana could have caused a drop in utilization when children were displaced to Texas. However, in 2006, copayments in Louisiana Medicaid ranged from 50 cents to $3 per prescription, whereas Texas Medicaid did not have any copayments for prescriptions (27). Another difference between Louisiana and Texas Medicaid that could potentially explain the larger drops in medication use for the TexKat group was a difference in formularies. If the Texas formulary was more restrictive than Louisiana's, the larger drops in medication use among children evacuated to Texas could be due to a decreased availability of covered medications. However, the analysis above was based on the Texas formulary, so that any medications available only in Louisiana were not included in the analysis, meaning that differences in formularies could not have caused the larger drops in medication use in the TexKat group.

TABLE 5. Change in the mean number of encounters among children in the TexKat and control groups between January 2005–June 2005 (2005 H1) and January 2006–June 2006 (2006 H1)

				Control group											
	TexKat (N=536)[a]			LA-disaster (N=26,097)[b]				LA-nondisaster (N=16,028)[c]				TX (N=59,289)[d]			
Encounter type	2005 H1	2006 H1	Change	2005 H1	2006 H1	Change	p[e]	2005 H1	2006 H1	Change	p[f]	2005 H1	2006 H1	Change	p[g]
Psychiatric services	.718	.875	.157	.767	1.091	.324	.437	.878	2.021	1.143	.001	3.626	5.641	2.016	<.001
Physician office	.914	.267	−.647	.986	.792	−.194	<.001	.950	.777	−.173	<.001	.323	.291	−.032	<.001
Emergency department	.062	.050	−.011	.046	.045	−.002	.641	.051	.045	−.006	.792	.025	.026	.001	.322
Inpatient	.037	.019	−.019	.023	.022	.000	.070	.029	.028	−.001	.110	.042	.042	.000	.187

[a] Children who lived in a county designated as a disaster county by the Federal Emergency Management Agency following Hurricane Katrina, were displaced to Texas, and were enrolled in the TexKat Medicaid waiver program for at least one month
[b] Children who lived in a Louisiana disaster zip code prior to Katrina but did not relocate to Texas
[c] Children from Louisiana who lived in a county that was not declared a disaster area following Katrina and did not relocate to Texas
[d] Children who were enrolled in Texas Medicaid
[e] Compared with the change in proportions for the TexKat group, df=26,631
[f] Compared with the change in proportions for the TexKat group, df=16,562
[g] Compared with the change in proportions for the TexKat group, df=59,823

Another possible cause besides Katrina for the larger medication decreases in the TexKat group was differences in physician prescribing behavior. For instance, the larger drops in the TexKat group may have reflected that Texas physicians generally prescribed fewer medications than those in Louisiana. However, the somewhat similar proportions of children who received at least one filled prescription for a psychotropic drug in 2005 H1 across the LA and TX control groups provide indirect but arguably weak evidence that differences in physician prescribing behavior at the state level were not responsible for the larger decreases in use of medication in the TexKat group.

Although we cannot preclude all other potential causes for our findings, it seems likely that the direct and indirect effects of Katrina are largely responsible. Treatment was likely disrupted for some children because of the effects of encountering a new environment. Thus, the larger drops could have been due to difficulties faced by families in getting prescriptions filled. Although the results for psychiatric services encounters suggest that the TexKat program did an admirable job in assisting families, the medication results suggest that families may have been unfamiliar with pharmacy options and unable to get their prescriptions filled.

Furthermore, providers who were relatively unfamiliar with children in the TexKat program may have been less likely to prescribe medications. If caregivers were unable to specify their child's treatment regimen while in Louisiana, Texas providers may have withheld or reduced medications until they became more familiar with the child's needs. Even if a treatment history was available, Texas providers may have chosen to observe the child for a period before prescribing medications.

Finally, families displaced by Katrina faced daunting emotional and logistical challenges. These families were uprooted from their homes and communities and had to establish new social, cultural, and financial connections in their new environments. It is understandable that some families may have found it impossible to perfectly adhere to medication regimens for their children.

Given the uncertainty regarding the precise cause or causes of the discrepancy in medication utilization between the TexKat and control groups, it is difficult to precisely identify changes to future disaster responses that would avoid similar outcomes. Furthermore, it is unlikely that a single "magic bullet" exists that would eliminate the problem. However, given that communication is common to many of the potential causes outlined above, outreach efforts could be very effective. For instance, public health officials could provide special guidance to providers noting the logistical issues faced by disaster victims and encouraging providers to make special efforts to ensure that any prescriptions they write are filled in a timely manner. Additionally, public service announcements and other marketing vehicles could be directed at parents of displaced children. Given the many challenges facing parents in the aftermath of a disaster, information to help them obtain medications for their children could provide significant results.

This study had several strengths. First, the topic of mental health utilization by children after a disaster is understudied yet crucially important, especially given the challenging circumstances in those environments. Also, the claims data employed in this study provide more detail and are more accurate than survey data. By limiting the analyses to children with preexisting conditions, the results do not conflate the effects of utilization by children who developed conditions only after the storm. The pre-post analysis of changes in utilization controlled for differences in pre-Katrina utilization levels and provided a more accurate estimate of the potential effect of the disaster. Finally, mental health utilization is a key aspect of disaster response that can have far-reaching effects.

However, several limitations should be noted. Although the control groups provided insight rarely found in disaster studies, displacement status was not randomly assigned and thus it not possible to make causal inferences about the effects of displacement on use of mental health services. There are likely unobservable characteristics correlated with displacement that prevent a causal interpretation of the differences in utilization.

Also, there were likely significant systemic differences between Louisiana and Texas that affected the pre-post changes we estimated. The two states may have varied in physician practice, Medicaid reimbursement, and other aspects in ways that could have influenced diagnosis, prescription, and service provision. These variations may partially explain, for instance, the larger percentages of children in the TX group who were diagnosed as having depression, bipolar illness, and PTSD (Table 1) or the prescription rates for many of the drug classes shown in Table 2. These differences imply that the pre-post changes for TexKat children may have been partially influenced by non-Katrina factors. For instance, the decrease in the proportion of children in the TexKat group with a physician office visit may be at least partially due to preexisting interstate differences, as evidenced by the relatively low rate in the TX group in 2005 H1. Unfortunately, our data do not allow us to isolate the impact of these differences.

Furthermore, although claims data potentially improve upon survey data, they are imperfect. Given that Medicaid is operated at the state level, differences in data recording may be present across Louisiana and Texas. However, that concern is somewhat mitigated by the fact that the data are processed by the federal government prior to release to researchers. There may also be errors in the 2006 data because of the aftermath of Katrina. However, the exclusion of data for more than four months after the storm lessened possible contamination. Also, the data represent only fee-for-service (FFS) claims. Although Louisiana Medicaid operates almost entirely on a FFS basis, urban Texas areas are served by managed care organizations. Thus, the estimates may suffer from sample selection bias if the children in these

organized plans significantly differ from children in FFS regions. However, the TexKat waiver provided coverage on a FFS basis, and thus the claims for the TexKat group should be relatively complete. Finally, the average days' supply outcome used here is an imperfect measure of therapy duration.

CONCLUSIONS

The courage and resourcefulness of responders to Hurricane Katrina's devastating impact were remarkable. Despite those efforts, victims faced hardships that they were unable to overcome. This study found that displaced children with preexisting mental health conditions generally appeared to have maintained the number of encounter visits after the storm, but their rate of medication utilization dropped relative to control groups. The findings suggest potential benefits of a greater emphasis on ensuring that psychotropic medications are available to disaster victims with mental health conditions.

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This research was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health (NIH), under award R03HD079758. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

Dr. Storch receives book royalties from Elsevier, Wiley, Springer, and the American Psychological Association. The other authors report no financial relationships with commercial interests.

Received June 21, 2017; revisions received August 10 and September 20, 2017; accepted October 20, 2017; published online January 15, 2018.

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