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Diabetes care provided to children displaced by Hurricane Katrina

Troy Quast, Ph.D.,
Sam Houston State University, Huntsville, TX

Karoline Mortensen
University of Maryland, College Park, MD

Abstract

While previous studies have examined the impact of Hurricane Katrina on adult diabetics, less is known regarding the effects on children with diabetes and on those displaced by the storm. We analyzed individual-level enrollment and utilization data of children with diabetes who were displaced from Louisiana and were enrolled in the Texas Medicaid Hurricane Katrina emergency waiver. We compared their utilization and outcomes to children who lived in areas less affected by Katrina. Data from both before and after the storm were employed to calculate difference-in-difference estimates of the effects of displacement on the children. We analyzed four diabetes management procedures (HBA1C tests, eye exams, microalbumin tests, and thyroid tests) and a complication from poor diabetes management (diabetic ketoacidosis, or DKA). We found that children enrolled in the waiver generally did not suffer a decrease in care relative to the control group while the waiver program was in effect. However, we observed a drop in care and an increase in complications relative to the control group after the waiver ends. Thus, while the waiver appears to have been largely successful immediately following Katrina, future waivers may be improved by ensuring enrollees continue to receive care after the waivers expire.

Keywords

Hurricane Katrina; disaster; diabetes; children

Introduction

Over 1.5 million people evacuated the U.S. Gulf Coast following Hurricane Katrina, one of the most destructive storms to hit the U.S.[1] Displacement can be particularly disruptive for diabetic children. Diabetics need ample supplies of insulin and other medications and must monitor their glucose and respond accordingly if adjustments are required.[2] Yet most families caring for children with diabetes are not prepared for self-management of the disease in the event of a major disaster and families of lower socioeconomic status are less prepared than higher income families.[3]

Correspondence: Troy Quast, Sam Houston State University, Box 2056, Huntsville, TX 77341, tcq001@shsu.edu, Fax: 928.441.7937.

Subject to federal approval, states can issue Medicaid emergency waivers to provide short-term health insurance coverage to those affected by disasters. Seventeen states issued waivers following Hurricane Katrina to provide coverage for those displaced and the federal government allocated $2 billion in aid to help assist states defray the costs of the waiver.[4] The waiver issued by Texas, known as TexKat, was the largest waiver and was in effect until June 2006.[5]

Relatively little is known regarding how well the Katrina Medicaid waivers performed. Further, while it has been shown that local adults experienced a severe disruption in diabetes management,[6,7] there is a gap in the literature on the effects of Hurricane Katrina on displaced individuals and children with diabetes.

Methods

We analyzed individual-level enrollment and claims data for children up to 17 years old enrolled in Louisiana Medicaid from 2004 – 2006. To obtain the most complete picture of health care, we limited our sample to children who were enrolled every month during the three-year period. We restricted our sample to individuals with a ICD9 diagnosis code of 250.xx, 357.2x, 362.0x, or 366.41 prior to September 2005.

We defined our control group as those children who meet the above criteria and lived in a county not designated by FEMA after Katrina as an individual disaster assistance. Children in the TexKat group are determined by whether their enrollment data indicate participation in the TexKat waiver program.

Table 1 compares the characteristics of the TexKat and control groups. The TexKat group is composed of 43 children, while the control group contains 742. Given the low statistical power resulting from the small sample of TexKat children, only descriptive statistics are reported.

Generally the gender and age profiles of the two groups are similar. Both groups have slightly more females than males and 11–17 years old is the largest age group. However, the TexKat group is almost entirely comprised of blacks while blacks make up than slightly more than half of the control group.

Our analysis consists of comparisons of the rates of diabetes maintenance tests and diabetes complications. We utilize difference-in-differences estimates, which can be thought of as a combination of pre-post and post-post comparisons. Specifically, we compare changes over time in the test and complication rates across the TexKat and control groups. By doing so, we control for differences across groups and over time.

An important condition for difference-in-difference analyses to be valid is the “parallel paths” assumption. This condition implies that, but for the treatment (here, displacement due to Hurricane Katrina), the test and complication rates would be roughly parallel between the two groups. While we do not have sufficient pre-Katrina data to thoroughly test this condition, two aspects are suggestive of this assumption not being violated. First, with the exception of race, the summary statistics shown in Table 1 are quite similar. Further, the

pre-Katrina rates shown in Table 2 below are also quite similar, suggesting that the use of these two groups likely satisfies the parallel paths condition.

We analyzed the frequency of four diabetes maintenance tests (HbA1c, eye, microalbumin, thyroid) and one diabetes complication (diabetic ketoacidosis, or DKA). (Laboratory test results are not available in our data.) We divided the 2004–2006 time period into three sections. The pre-Katrina time period is defined as January 2004 – August 2005, the during TexKat period spans September 2005 – June 2006, and the post TexKat period is July 2006 – December 2006.

Results

Table 2 contains the annualized proportion of children in the TexKat and control groups who had the specified test or complication for each of the three time periods. The table is divided vertically into five sections: four for the maintenance tests and one for DKA diagnoses. For the during and post TexKat periods, the changes in proportions relative to the pre-Katrina period are shown. The three sets of columns correspond to all children and for each gender. Within each column set, the proportions are displayed for the TexKat and control groups as well as the difference between the two.

The difference-in-difference estimates are reported at the intersections of the change rows and difference columns. For example, for the HbA1c tests for all children, the proportions both prior to Katrina and during TexKat were identical. Thus, the changes are identical and the difference-in-difference estimate is 0. By contrast, the post TexKat proportion is 0.42 for the TexKat group and 0.61 for the control group. Thus, the difference-in-difference estimate is −0.19 since the change for the TexKat group is 0.19 less than for the control group.

Except for eye exams, the pre-Katrina proportions of the tests and complications are remarkably similar across the TexKat and control groups. This characteristic is supports the plausibility of the parallel paths condition described above.

Again, with the exception of eye exams, the during TexKat proportions for the maintenance tests are relatively consistent across the two groups. The HbA1c proportions are exactly equal, while the TexKat microalbumin and thyroid proportions are slightly higher than those of the control group. Except for eye exams, the resulting difference-in-difference estimates are quite small and positive in magnitude, ranging from 0 for HbA1c to 0.06 for thyroid.

By contrast, the −0.19 difference-in-difference estimate for eye exams reflects the drop in the during TexKat period for the TexKat group and the increase in the control group. This relatively large, negative estimate suggest that displacement may have caused a fall in the adherence rate for these exams. The proportions by gender indicate that the drop was especially pronounced for females.

The DKA proportions for all children show a rise in during TexKat period for both groups, with a somewhat larger increase for the TexKat group. The proportions by gender indicate that the increase is largely due to females, with the complication rate nearly doubling for the TexKat group.

The post TexKat difference-in-difference estimates for all four of the diagnostic tests are negative. For three of the four tests, while the rates increased for the control group, they decreased for the TexKat group. For instance, for microalbumin tests, the proportion for the TexKat group fell from 0.14 to 0.09 while it increased for the control group from 0.10 to 0.13. When analyzing by gender, the drops in the proportions of HbA1c and thyroid tests are driven by males.

The difference-in-difference estimate for DKA diagnosis increased in the post TexKat period relative to the during TexKat period. While the complication rate stabilized for the control group, it continued to increase for the TexKat group. As was the case for the during TexKat period, the positive difference-in-difference estimate is largely due to females.

Conclusions

Our results suggest that the TexKat program was largely successful in providing short-term care to children with diabetes who were displaced by Hurricane Katrina. With the exception of eye exams, the proportions of children who received recommended maintenance tests either remained the same or even increased slightly. While the increase in the proportion of children with DKA diagnosis during TexKat was slightly greater for the TexKat group than the control group, the small difference is arguably understandable given the trauma of displacement.

However, those positive findings for the period immediately following Katrina reverse somewhat for the post TexKat period. While the proportion of children who received recommended tests continued to increase for the control group, they either fell or grew at a much slower rate for the TexKat group. Also, while the rate of DKA diagnoses stabilized in the post TexKat period for the control group, they continued to increase for the TexKat group.

Our findings indicate that while the Texas Katrina emergency waiver appears to have functioned well in the period immediately following the hurricane, Medicaid emergency waivers could be improved by ensuring that individuals continue to receive care after the waiver ends. Further, our estimates of the post-waiver effects can be considered as a lower bound, given our sample was restricted to those who were continuously enrolled in Medicaid. Those who were not enrolled in Medicaid following the waiver likely suffered an even greater disruption in care. Thus, the potential benefits of changes to ensure continuity of care could be greater than our estimates indicate.

A number of potential improvements could be implemented to improve continuity of care following emergency waivers. For instance, outreach could be provided to waiver enrollees to assist them in enrolling in traditional Medicaid. For those who transition to traditional Medicaid, information should be targeted to these individuals to ensure that they are aware of their coverage and the availability of care. Further, it has been recommended in the past that for future disaster preparedness, Congress should enact a permanent, emergency Medicaid authority to quickly extend coverage to broad or targeted groups.[8]

Natural disasters like Hurricane Katrina have demonstrated that a key challenge to response and recovery is creating national policies and making national decisions that translate well to local levels.[9] Policymakers at the local and state levels should consider partnering with health care providers in pre-disaster planning and organization of resources. The Affordable Care Act's increased investments in health centers[10] (Health and Human Services, 2014) are designed to improved quality of care as well as coordination of care, which may prove to be instrumental in helping providers deliver continuous post-disaster care for vulnerable populations.

There are several significant limitations to this study. First and foremost, our small TexKat sample prevents us from establishing statistically significant differences across the proportions of the TexKat and control groups. Relatedly, our restriction to children continuously enrolled in Medicaid during the 2004–2006 period, while necessary to observe complete picture of the health care received by children, significantly restricts our sample. Also, differences in the racial composition between the TexKat and control groups may have an effect on the health care received by the two groups and thus our estimates may not purely reflect the effect of displacement.

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Table 1 –

Summary characteristics of TexKat and control groups

	TexKat		Control	
	Number	**Proportion**	**Number**	**Proportion**
Total enrollees	43	1.00	742	1.00
Gender				
Female	24	0.56	416	0.56
Male	19	0.44	326	0.44
Age				
0–5 years old	11	0.26	106	0.14
6–10 years old	8	0.19	163	0.22
11–17 years old	24	0.56	473	0.64
Race/ethnicity				
White	1	0.02	279	0.38
Black	41	0.95	401	0.54
Hispanic	1	0.02	11	0.01
Other	0	0.00	51	0.07

Table 2 –

Difference-in-difference estimates of the proportion of children receiving maintenance tests and experiencing a complication

	All children			Females			Males		
	TexKat (n=43)	Control (n=742)	Diff	TexKat (n=24)	Control (n=416)	Diff	TexKat (n=19)	Control (n=326)	Diff
HBA1C test									
Prior to Katrina	0.31	0.31	0.00	0.30	0.32	−0.02	0.32	0.29	0.02
During TexKat	0.45	0.45	0.00	0.45	0.47	−0.02	0.44	0.42	0.02
Change	0.14	0.14	0.00	0.15	0.15	0.00	0.13	0.13	0.00
Post TexKat	0.42	0.61	−0.19	0.50	0.64	−0.14	0.32	0.56	−0.25
Change	0.11	0.30	−0.19	0.20	0.33	−0.13	0.00	0.27	−0.27
Eye exam									
Prior to Katrina	0.18	0.29	−0.11	0.25	0.31	−0.06	0.10	0.26	−0.17
During TexKat	0.06	0.35	−0.30	0.10	0.40	−0.30	0.00	0.30	−0.30
Change	−0.13	0.06	−0.19	−0.15	0.08	−0.23	−0.10	0.04	−0.13
Post TexKat	0.14	0.41	−0.27	0.17	0.43	−0.27	0.11	0.38	−0.28
Change	−0.04	0.12	−0.16	−0.08	0.12	−0.20	0.01	0.12	−0.11
Microalbumin test									
Prior to Katrina	0.11	0.09	0.03	0.15	0.09	0.06	0.06	0.09	−0.02
During TexKat	0.14	0.10	0.04	0.20	0.10	0.10	0.06	0.10	−0.04
Change	0.03	0.01	0.02	0.05	0.01	0.04	0.00	0.02	−0.02
Post TexKat	0.09	0.13	−0.04	0.17	0.11	0.06	0.00	0.16	−0.16
Change	−0.02	0.04	−0.06	0.02	0.02	0.00	−0.06	0.07	−0.14
Thyroid test									
Prior to Katrina	0.22	0.24	−0.01	0.25	0.26	−0.01	0.19	0.20	−0.01
During TexKat	0.31	0.26	0.05	0.40	0.27	0.14	0.19	0.24	−0.05
Change	0.08	0.02	0.06	0.15	0.00	0.15	0.00	0.04	−0.04
Post TexKat	0.28	0.32	−0.04	0.25	0.34	−0.09	0.32	0.29	0.02
Change	0.06	0.09	−0.03	0.00	0.08	−0.08	0.13	0.09	0.04
DKA diagnosis									
Prior to Katrina	0.07	0.07	0.00	0.08	0.08	0.00	0.06	0.07	−0.01
During TexKat	0.11	0.09	0.02	0.15	0.10	0.05	0.06	0.07	−0.01
Change	0.04	0.02	0.03	0.08	0.03	0.05	0.00	0.00	0.00
Post TexKat	0.14	0.09	0.05	0.17	0.10	0.07	0.11	0.09	0.01
Change	0.07	0.02	0.05	0.09	0.02	0.07	0.04	0.02	0.02