

Pediatrics Hospital Care in China Before and After Policy Change: A Case Study

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ABSTRACT

Worldwide, healthcare policy change ranks among the top three issues in the public's consciousness. This study introduces a case study of pediatric hospitalizations at one hospital in Northern China. It seeks to assess whether pediatric hospitalization access, costs, and costs structures favorably changed after selected health policy reforms were implemented in China.

A census of all hospital pediatric discharge data from 2015 to 2018 were collected from a general public tertiary hospital in Northern China. Using generalized linear regression, changes in charges for length of stay, daily charges, total charges per discharge, and drug charges and medical service fees as a percent of total charges were analyzed as a function of two independent variables - policy changes regarding the merger of two health insurance programs, and the zero-markup drug pricing policy. These variables were included as dummy variables for the pre-and-post change periods. The covariates used included patient age, sex, and the year.

After the policy implementation, significant decreases ($P < .01$) were found in the length of the hospital stay (-0.49 days) and drug and medical charges (-7.63%) as a percent of total charges. A significant decrease also occurred ($P < .01$) in the number and percent of pediatric patients served who were self-pay after the merger of the NCMS insurance plan into the URBMI. Drug costs as a proportion of total costs also decreased significantly ($P < .01$). Thus, the findings revealed that the zero-markup drug pricing policy was associated with a significant decrease ($P < .01$) in the mean percentage markup for drug charges ($P < .01$).

Accordingly, both health policy changes were associated with positive effects on pediatric healthcare expenditures, and access. This research suggests that as these two policies are fully implemented at public tertiary hospitals throughout China, pediatric hospital care may become even more accessible and drugs less costly.

Keywords: pediatric care, health insurance, policy, China

INTRODUCTION

Pediatric health care can be characterized by patterns of underinvestment in both mature and developing countries. As a result, researchers have maintained that available pediatric health care system components require strengthening in order to address the preventable acute and chronic illnesses that now confront children (Kuo et al., 2012). Although some analysts have suggested that there is a worldwide need for alterations in pediatric health care delivery systems (Tripodi 2017), improving pediatric health care access, quality, and costs is complicated due to the intricate relationship between parental health assets and pediatric health.

Accordingly, it is less than surprising that a key component of healthcare reform worldwide has been the specific inclusion of policy changes that seek to align with improvements in pediatric health. For example, Grace et al. (2015) highlights the fact that whether reviewing actual health policy changes such as those included in the Affordable Care Act and/or other reform efforts in the United States, pediatric health policy changes have been an intricate component of the proposed measures. However, Arnold (2016) makes a highly compelling argument for a body of scholarship that utilizes evidence from policy changes worldwide in order to gain instruction on assessing whether various policy changes occur in a delayed tandem with pediatric health improvements. Specifically, Arnold states, "When it comes to children, there is no "them" and "us"...we must commit to improving the lives of children

everywhere, by addressing global barriers to children's health" (ibid pg. 2015). Arora et al. (2018) also highlight the immediacy of ignoring geopolitical boundaries when the demographic foci of healthcare services is children. Accordingly, while this study is based on a case study of one hospital in China, it has methodological implications for the assessment of micro-level changes in pediatric health services in any geopolitical area. It also embodies implications for strategies to decrease costs and increase access to hospitalization for children in need of acute healthcare. As a context for this study, it is necessary to briefly describe the two major policies that serve as the framework for this analysis.

Health Policy Changes in China: 2009-2019

Meng (2019) provides a succinct description of the impetus, contents, financing mechanisms, and fragilities in the massive healthcare policy reforms that were initiated in China in 2009. By changing policies related to healthcare access, costs, and quality, China implemented health policy changes that granted access to health insurance to the largest collectivity of individuals and families in the history of humankind by 2011 (Yu, 2015). But, as is always true, policy changes only define a new macro-level framework. The numerous micro-level aspects of the re-sculpted healthcare system become calibrated and refined over a period of time.

For example, in 2019, the United Nations (2019), estimated that China's population exceeded 1.4 billion people. Approximately, 17.8% of this population were 15 years of age or younger. Yet, relative to the insured population in China, major disparities had emerged early within the framework of reform between the number of insured children under the age of five compared to the entire population. Xiong (2013) reported that only 38% of the children younger than five years of age were insured despite a previous study's finding that more than 90% of the overall population in China did have insurance coverage (Meng et al., 2012). Thus, it appears that children 5 years of age and under had continued to be among China's most vulnerable populations despite the constant and continuing changes made possible through health policy reforms.

Asymmetries in addressing the various needs of the pediatric population were not without consequences. While death rates for children less than five years of age did drop in the post-2009 policy period, the research also revealed that pneumonia, accidents, congenital abnormalities, and other diseases and illnesses led to disparate death rates between children under five among different population groups (Song et al., 2016). For example, disaggregated data demonstrated that children five years of age and younger living in lower income areas had higher mortality rates from pneumonia when compared with children from higher income families even when hospital care was available. In contrast, congenital birth defects were disproportionately causatively associated with the mortality rate of children whose parents were higher income. While these informative and influential studies provide insight into the pediatric health needs of children in China, they also highlight the importance of examining the relationship between hospital access and costs for children with pneumonia and other potentially life-threatening diseases. Such disparities also elevate the importance of

reviewing various health policy measures in order to determine whether access to hospitalization for children was differentially distributed based on insurance status and/or insurance sources.

As is known, the 2009 health reform effort established three basic medical insurance programs for different populations in China. The *Urban Employee's Basic Medical Insurance* (UEBMI) provided medical insurance for the urban working population. The *Urban Resident Basic Medical Insurance* (URBMI) covered urban residents who were not employed. The New Rural Cooperative Medical System (NCMS) was a voluntary program that provided financial subsidies to support access to medical services among rural residents (Wang, 2014). Likewise, despite measures to ensure that 100% of residents of China were enrolled in a health insurance plan, a number of families continued to be assignable to the category of self-pay.

Cognizant that all new policy frameworks require modification and adjustment as unanticipated results are revealed, China continued refining its health care system. For example, the Urban Resident Basic Medical Insurance and the New Rural Cooperative Medical Scheme were merged. Additional changes also focused on hospital financial and operational performance including tackling issues related to the overcharging for prescription drugs and the resultant waste and fraud in prescription drug use. For example, over-diagnosis of disease and illnesses was one outcome associated with the new policies surrounding prescription drugs markups. Thus, new policy measures that focused on zero-markup drug pricing reform and a prospective payment system were implemented in an attempt to reduce abuse in health care charges. Further reforms elevated health insurance coverage to 95% of the total population. Continuing health care reform also led to an increase in the number of hospitals in China from approximately 20,291 in 2009 to approximately 33,009 by 2018 (China Hospital Industry Report, 2018).

Despite the breadth of the health policies changes, these basic insurance plans did not include children and teenagers. Before 2009, children had been allowed to receive coverage through the basic medical insurance provided by URBMI and NCMS (Wang, 2012). Nevertheless, some children from poor families or some younger children remained uninsured and thus were self-pay clients. As a result, these children and their families had little or no access to health care (Lu, 2008; Zhang, 2014; Zhi-ruo et al., 2011). Thus, a large body of empirical data illustrated to the Chinese government that they should increase the national health allocation and focus on those children without insurance as a key population.

The analysts were heard and further modifications were made. One outcome was that the medical insurance coverage improvements reduced families' economic burden. This was particularly observable among families of children with severe chronic illnesses. Zhang et al. (2011) contended that the availability of health insurance created a health security system for children with catastrophic illnesses at the national level based on URBMI and NCMS. Indeed, Rosenthal (2019) points out that policy changes in China particularly affected the collective access of children under the age of six to hospitalization care for seventeen acute and chronic conditions - pulmonary infection, lobar pneumonia,

bronchopneumonia, acute bronchitis, acute tonsillitis, acute bronchitis, acute upper respiratory infection, epilepsy, other intractable epilepsy without status epileptics, status epilepticus, seizure (convulsions), febrile convulsions, seizure convulsive, and allergic purpura (anaphylactoid purpura). The newer policies have also improved reimbursements to the pediatric departments in hospitals for treating common diseases such as pneumonia, acute bronchitis, acute bronchiolitis, acute tonsillitis, epilepsy, seizure, febrile convulsions, and allergic purpura. These changes may have generated a decline in the proportion of all hospital costs that were allocated to pharmaceutical products.

Policy change, however, is not an intervention. Rather, it serves as an overall framework that allows new structures, processes, and outcomes to take place. This case study attempts to provide additional empirical evidence on the before and after operational outcomes that were aligned with the medical insurance merger and the drug policy reform efforts in China. Specifically, it utilizes one hospital as a case study that is designed to answer two pediatric health research questions: 1) When compared with the pre-policy change implementation period, did the merger of NCMS and URBMI appear to be aligned with changes in healthcare access and costs for pediatric patients? and 2) Did the drug markup restrictions policy co-align with decreases in the level and proportion of pediatric hospital costs that accrued for drugs during the hospital stay? These two research questions do not suggest a direct causative relationship between macro-level policy change and change at the micro-level of one hospital. Rather, this study is designed to provide insights into the diffusion process that accompanied health policy change in China. It seeks to determine whether some evidence exists that the policy changes may have corresponded with the targeted outcomes for pediatric care at the hospital selected as the case study. In this regards, this study tests the viability of empirically “mapping” the outcomes associated with policy change as various institutions respond to the alterations in the healthcare administration practices embodied in the policy changes.

Huesch and Mosher (2017) argue that the healthcare industry is one of the most data intensive divisions of the economy in all countries. Accordingly, data for this study were collected from a general public tertiary hospital in Northern China that included a pediatric department. Hospitals in China are classified into three broad categories. Primary hospitals, those with 100 beds or less, tend to serve smaller, rural communities. Rather than critical care, the focus of primary hospitals is on the delivery of services that can prevent and/or delay illness and disease. However, limited healthcare services are also provided. In contrast, secondary hospitals in China - a category that embraces acute care institutions with 101-499 beds - deliver the full range of acute care services to moderate-sized geographical areas whether defined by city, county, or district size. These hospitals also engage in the training of medical personnel and in geographically important research. Finally, tertiary hospitals are broad-based, full-service, hospitals with greater than 500 beds. Not only are these hospitals capable of delivering highly specialized care, they also act as medical hubs for the training of physicians and for

Table 1. Illnesses and Diseases for Which Pediatric Care was Provided and the Selected Hospital

J98.402	pulmonary infection
J18.101	lobar pneumonia
J18.003	bronchopneumonia
J18.901	pneumonia
J15.702	mycoplasma pneumonia
J20.904	acute bronchitis
J21.902	acute bronchiolitis
J03.903	acute tonsillitis
J20.906	acute bronchitis
J06.903	acute upper respiratory infection
G40.901	epilepsy
G40.804	other epilepsy, intractable, without status epilepticus
G41.901	status epilepticus
R56.802	seizure (convulsions)
R56.001	febrile convulsions
R56.801	seizure (convulsive)
D69.004	Allergic purpura (anaphylactoid purpura)

the execution of *research* that is relevant to the whole of China and to the world.

The hospital selected for this study was, as mentioned, a tertiary one. A tertiary hospital site was needed to ensure that it was one that provided pediatric hospitalization. Additionally, a hospital pediatric census size was needed that was representative of families with the types of insurance enrollments that were integral to the study. Of key importance, this hospital had reliable and complete pediatric medical records for the period before and after the 2017 policy change implementation that included the merger of the Urban Resident-based Medical Insurance Scheme and the Rural Cooperative Medical Scheme. However, at the time of data collection, the merger remained incomplete. Accordingly, the study compared the pre/post policy change’s effects upon pediatric hospital care for children in the URBMI who had previously been insured by NCMS and those who remained under NCMS as well as children who were hospitalized via self-pay arrangements made by their parents. Thus, data were available on 100% of children under 16 years of age who had been admitted during the period of the study. This allowed data collection to occur as a census rather than by means of statistical sampling. The study was approved by the Ethical Review Committee of The First Hospital of Qinhuangdao in China, the hospital that served as the case study for the research. **Table 1** lists the primary pediatric clinical conditions for which services had been provided over the course of the study period based upon a detailed review of medical records.

METHODS

Research Design

Using hospital discharge as a unit of analysis, the period of the study was January 1, 2015 to December 31, 2016 for the prior policy implementation change period and January 1, 2017 to December 31, 2018 for the post-policy period. Since all dependent variables - hospitalization admission numbers and percents, length of stay, total and average daily charges, and the distribution of charge between drugs and medical services

- were continuous, they were analyzed using generalized linear regression. Age and gender served as covariates. In order to further assess the relationship of the pre-policy and post-policy change implementation variables and the changes in costs, sensitivity analysis was completed by interchanging the data from the two policy periods. These recalculations substantially reduced uncertainty related to the outcomes by demonstrating the robustness of the initial and final outcomes. Changes that occurred with a probability level of $P < .05$ were considered as significant.

Measures

Data were collected from the hospital records on the number of pediatric patients admitted under URBMI, NCMS, and self-pay as types of "insurance" for the prior and post policy change implementation periods. Demographic data were collected on the insurance status and total charges for children under the age of 16 years for both periods. Total charges as measured in yuan and average daily charges were extracted for the entire universe of pediatric patients rather than from random samples of the health records of the children served. Given the financial nature of the second research question - policy change that sought to reduce and/or eliminate the practice of marking up drug charges - drug charges and medical service charges as a percent of total charges were separately examined. In addition, length of hospital stay was also analyzed. Independent variables included a dummy variable indicating the policy implementation and health insurance coverage attributes for each of the three insurance programs.

Hypotheses and Variables

This study tested the hypothesis that there was no relationship between the implementation of two changes in one period - the merger of two health insurance programs and a zero-markup drug policy - with changes in pediatric hospitalization access and drug costs in a subsequent time period. As mentioned, generalized linear regression was applied to data from one tertiary hospital, the First Hospital of Qinhuangdao in China. The data used was based upon a census of all children under age 16 who had been admitted to the hospital for any reason during the period of the study at the hospital that served as the case study for the research. The independent variables were the two policy changes - the implementation of the merger of the Urban Resident-based Medical Insurance Scheme and the Rural Cooperative Medical Scheme in the Northern area of China and the expansion of a zero-markup policy that eliminated the use of drug markups as a mechanism for supplementing the incomes of medical providers. In contrast, the access-related dependent variables included changes in health insurance status, total charges, and average daily charges between the two periods. In contrast, drug markup policy related dependent variables were changes in drug charges as a percent of total and average daily charges and drug charges versus medical costs as a percentage of total costs. Patient characteristics and the year served as co-variables. The significance of any measured changes between the before and after policy changes and key patient characteristics as measured by age and sex were assessed. Changes that occurred at a $P < .05$ level or less were considered significant. Changes with a magnitude of $P < .10$ were assigned

to the category of marginally significant. Generalized linear regression was selected because a non-normal distribution with a link function was implicit to the research design, i.e., two time periods, insurance mergers, etc.

Sources of Data

The tertiary hospital that served as the case study for this research provided several sources of data for this project. Personal information, i.e., patient name, address, phone number, postal code, were pre-masked. Medical records from each pediatric patient admitted were selected. The data were separately stratified for the pre-post policy intervention periods. All files for both periods contained primary and secondary diagnosis name and code, gender, age, length of stay, total costs, material costs, pharmacy costs, and nursing costs data. The only exclusion criteria for the data collection effort were cases in which the hospitalized patient exceeded the age of 15 years, the length of stay equaled zero, total costs of services fell below 5 CNY, age, sex, or primary diagnosis were not included in the file, and /or data errors and/or omissions were observed such as the admission and discharge date, and/or the primary diagnosis. ICD-10 disease classification with an ICD-10 code also served as a basis for the cleansing of the data.

RESULTS

Table 2 summarizes the descriptive findings of the study. The results indicate that pediatric hospitalization total charges were highest for the NCMS policyholders prior to the policy change - 8,361 yuan while the figures for URBMI and self-pay patients were 7,235 and 7,378 yuan, respectively. The analysis of average daily charges, a more accurate measure of differential cost/charges by insurance status, revealed even greater differences between URBMI insurance enrollees and self-pay families who experienced pediatric hospitalizations during the prior policy change time period. The rates were 990 yuan for URBMI enrollees and 1,300 average daily charges for self-pay families. The percent of the total charges, 29.4% that were for drugs was 24.1% higher for URBMI insured children than for self-pay children (23.7%). However, medical services charges as a percent of total charges were quite similar between URBMI and self-pay participants - 22.1% and 23.8%.

During the post-policy change period, total pediatric hospitalization charges decreased for both URBMI families (7,235 vs. 6,692), and self-pay patients (7,378 vs. 6,894). Moreover, the gap between the average daily charges - 990 vs. 1,020 yuan for URBMI insured families and 1,300 vs. 1,145 yuan for self-pay families-decreased. In the before-policy implementation change period, self-pay families paid an average of 31.3% more. In the post-policy change period, this difference had dropped to 12.3% for average daily charges. Drug charges as a percent of total charges also decreased for both URBMI insured families (29.4% vs. 20.9%), and self-pay families (23.7% vs. 18.7%). Finally, medical service charges as a percent of total charges increased from 22.1% to 27.9% for URBMI families and 23.8 to 30.1% for self-pay families. The charges do not appear to differ by very much in terms of the proportion of charges between URBMI and self-pay families

Table 2. Participants Characteristics (N = 2, 826)

Variable	Prior Policy Change			
	URBMI % (n = 433)	NCMS % (n = 604)	Self-Pay % (n = 375)	Total 1412
Demographics				
Age, year	4.9(3.8)	5.2(3.9)	50.1(16.6)	4.8(3.8)
Female, %	41.1	42.9	42.5	42.4
Hospitalization				
Length of stay (LOS), day	7.7(4.2)	8.4(5.2)	6.6(4.2)	7.7(4.7)
Total charge, yuan	7,235(7,731)	8,361(14,281)	7,378 (8,054)	7,741(10,872)
Average daily charge, yuan	990 (715)	996 (795)	1300 (1078)	1072(871)
% drug charges of total charges	29.4 (14.5)	30.2 (14.9)	23.7 (14.2)	28.1(14.7)
% of medical services charges of total charges	22.1 (8.5)	22.2 (8.5)	23.8 (9.6)	22.6(8.8)
Variable	Post Policy Change			
	URBMI % (n = 879)	NCMS % (n = 57)	Self-Pay % (n = 258)	Total 1194
Demographics				
Age, year	5.2(3.9)	4.9(4.0)	5.1(3.8)	5.1(3.9)
Female, %	42.1	36.8	43.8	41.6
Hospitalization				
Length of stay (LOS), day	7.1(3.9)	8.3(11.8)	6.6(3.6)	7.0(4.5)
Total charge, yuan	6,692 (5,974)	13,717 (35,074)	6,894 (5,142)	7,019(9,394)
Average daily charge, yuan	1020 (754)	1752 (1502)	1,145 (781)	1090(838)
% drug charges of total charges	20.9 (12.8)	14.2 (10.2)	18.7 (12.0)	20.2(12.7)
% of medical services charges of total charges	27.9 (9.9)	27.8 (10.9)	30.1 (10.4)	28.4(10.2)

Data are expressed as mean and standard deviation (st.d.) unless otherwise indicated.

Yuan: the Chinese currency

since the length of stay remained constant for self-pay but declined for URBMI insured families (**Table 2**).

Table 3 shows the results of those factors associated with patients' length of stay, total charges, average discharge rates, percent of drug charges and percent of medical service charges. Compared to patients with URBMI, patients with NCMS, on average, stayed in the hospital 0.76 days longer whereas self-pay patients stayed in the hospital for a 0.74 day shorter period of time. Further, the average length of stay was 0.49 days shorter after the policy implementation period. In addition, the age of the child was positively related to the length of stay. Also, relative to URBMI-insured pediatric hospitalizations, the total charges were marginally higher (638.8 yuan) for the remaining NCMS patients who had not yet been merged into URBMI, but much higher (1,546.2 yuan) for self-pay families. The same pattern continued with the average daily charges. Likewise, while average daily costs were only marginally higher (76.5 yuan) for the "un-merged" NCMS pediatric hospitalizations, they were much higher (252.3 yuan) for the self-pay/uninsured families. The policy implementation did not show much impact on both the total charges and the average daily charges.

While drug charges as a percent of total charges for pediatric hospitalizations did not decrease for the remaining families that had not been transitioned out of the NCMS, they decreased 3.37% for self-pay families. This decrease was also associated with policy change implementation given that the percent of drug charges among the total charges declined 7.63% after the policy implementation (**Table 3**).

Finally, the percent of the total charges that were allotted to medical services increased 1.97% for self-pay pediatric hospitalizations relative to URBMI. The overall impact from the policy implementation was a 6.17% increase in medical

services charges as a percent of the total charges (**Table 3**). As **Table 3** reveals, these changes were significant.

Liu et al. (2018) define the magnitude of the burden of providing pediatric health care in China. With an estimated pediatric population that exceeds 227 million children, China has consistently sought to expand and deepen pediatric health care resources. Our study acknowledges these efforts by documenting some positive impacts that appear to be associated with both policy changes in China.

Our findings regarding the structure of the total charges for hospitalization reveal that the proportion of total costs expended for drugs during the length of stay decreased from the pre-policy period to the post-policy period. As a result, a greater proportion of the costs of hospitalization resulted from medical services. Such an outcome is normally a positive one in pediatric care. Feinstein (2015), in a study of medication use in pediatric hospitalizations, found an inverse relationship between the use of medications and positive outcomes from the pediatric hospitalization experience. Lebowitz et al (2016) reported a higher rate of drug interactions for children hospitalized with epilepsy. Cohen et al. (2017), in a study of medication costs among outpatient pediatric patients also found an inverse relationship with outcomes. However, while the implementation of the policy prohibiting excessive drug-markup by hospitals in China was not implemented for this specific purpose, it appears to have been effective in the area of pediatric health.

Although we found little change in total charges, we did observe declines in length of hospital stay after the new health policies were implemented. According to Jia (2019) who completed a study for a time period before the dates of this case study, a positive relationship exists between hospital-acquired infections and length of stay (LOS). Specifically, Jia's

Table 3. Factors Associated with Hospitalized Pediatric Patients' Length of Stay, Total Charges, Average Discharge, % of Drug Charges, and % of Median Service Charges

Variable	Parameter Estimate	Standard Error	p-Value
(1) Length of stay (LOS), day			
Health insurance status			
- URBMI (reference)	-	-	-
- NCMS	0.76	0.25	< 0.01*
- Self-pay	-0.74	0.23	< 0.01*
Policy implementation			
- Before	-	-	-
- After	-0.49	0.19	0.01*
Age	0.12	0.02	< 0.01*
Sex			
- Female (reference)	-	-	-
- Male	0.12	0.17	0.51
(2) Total charges, in yuan			
Health insurance status			
- URBMI (reference)	-	-	-
- NCMS	683.8	396.6	0.08**
- Self-pay	1546.2	366.3	< 0.01*
Policy			
- Before	-	-	-
- After	621.9	314.3	0.05**
Age	49.9	36.4	0.17
Sex			
- Female (reference)	-	-	-
- Male	388.4	280.4	0.17
LOS	1539.4	30.4	< 0.01*
(3) Average daily charges, in yuan			
Health insurance status			
- URBMI (reference)	-	-	-
- NCMS	76.5	45.6	0.09**
- Self-pay	252.3	42.1	< 0.01*
Policy implementation			
- Before	-	-	-
- After	48.5	36.1	0.18
Age	25.3	4.2	< 0.01*
Sex			
- Female (reference)	-	-	-
- Male	25.2	32.3	0.44
(4) Percentage of drug charges			
Health insurance status			
- URBMI (reference)	-	-	-
- NCMS	-0.31	0.70	0.66
- Self-pay	-3.37	0.65	< 0.01*
Policy			
- Before	-	-	-
- After	-7.63	0.56	< 0.01*
Age	0.26	0.06	< 0.01*
Sex			
- Female (reference)	-	-	-
- Male	-0.30	0.50	0.55
LOS	0.89	0.05	< 0.01*
(5) % of Medical service charges			
Health insurance status			
- URBMI (reference)	-	-	-
- NCMS	0.14	0.50	0.78
- Self-pay	1.97	0.46	< 0.01*
Policy			
- Before	-	-	-
- After	6.17	0.40	< 0.01*
Age	-0.28	0.05	< 0.01*
Sex			
- Female (reference)	-	-	-
- Male	0.51	0.36	0.15
LOS	0.18	0.04	< 0.01*

Yuan: the Chinese currency * = P < .05 ** = P < .10

study found that regardless of infection sites, hospital acquired infections for pediatric hospitalized patients were associated with a longer length of stay. Accordingly, one may theorize that the shorter length of stays for the pediatric patients across all insurance types in the post-policy period suggests that the overall policy change may have been associated with still another positive outcome in terms of pediatric hospitalizations.

In addition to the described positive outcomes that may be associated with the policy change, the case study also reveals some areas that may require additional broad-based policy changes as a framework for improvements in the area of pediatric hospitalizations. For example, the case study revealed the continuation of access differentials to pediatric hospital care by health insurance status. For example, the even shorter length of stay for self-pay families relative to URBMI-insured families indicate that the earlier releases may not have been related to earlier “healing” but to an absence of a source of payment for a longer stay. This hypothesis is consistent with that of other researchers who have reported that self-pay pediatric patients without health insurance generally have shorter lengths of stay than persons who are insured (Baek et al., 2018; Mainous, 2011).

Thus, policy revisions in China’s universal care policies may be needed which result in a zero percent self-pay for pediatric hospitalizations. The need for additional policy change is also suggested by the fact that differences in total charges existed across different health insurance programs even after the relevant new health policies had been implemented. Specifically, self-pay patients incurred higher charges than those with health insurance. This suggests a continuing need for policies that further decrease the proportion of self-pay families with children so that hospital care expenditures do not limit and/or deny access to pediatric hospitalization services for those who need them. Because self-pay patients do not have the benefit of negotiating rates that are provided by insurance plans, additional policy efforts that focus on bringing the uninsured population into China’s universal health care system appear to be needed. Previous reform efforts in China that began in 2003 were associated with a broadening of China’s universal health care goals by 2011 (Sun, 2017). The newest reform implementations since that time appear to have furthered this goal by reducing the number of families who engaged in self-pay in order to receive pediatric hospitalization care by 31.2%. Thus, while this decrease did not eliminate all self-care costs, it does demonstrate another positive change in direction relative to the achievements of the ultimate goals of the continuous process of health care reform in China. Our study, in this regard, is aligned with findings from several existing studies. Zhang, Gao, et al. (2017) reminds analysts that China has invested in more pediatric hospital beds, pediatric health care providers, and other resources to improve not merely pediatric hospitalization outcomes, but pediatric health in general. Our findings appear to lend support to this point.

CONCLUSION

This study has, as is quite apparent, a number of limitations. First, our study was based on only one tertiary hospital. Accordingly, such findings must be interpreted with caution since they do not allow generalization to other hospitals or locations. Second, our research aggregated pediatric hospitalizations across illnesses and diseases and, in doing so, disallowed disease-specific comparisons of observed changes. This is an important limitation since other studies have examined disease specific conditions such as chronic conditions or infectious diseases and discovered results which suggest the possibility of different findings (Witt et al., 2014; Zhu et al., 2018). Thus, further research is needed that attempts to hold constant the illness/disease that led to the hospitalization. Similarly, length of stay may be related to the severity of the illness/disease. Yang et al. (2019), for example, discuss the impact of delayed treatment upon pediatric patients with mycoplasma pneumonia. Based upon these researchers, delayed treatment can increase resistance and lead to longer hospital stays and more expensive treatments. Likewise, persons who are self-pay may have higher costs because of delays in care. Due to the lack of this information in our dataset, we were unable to control for these potential factors. But, it is important to remember that because the case study is for the same hospital over two fairly close periods in time, no evidence suggests that the demographic, psychographic, nor clinical composition of the patients served may have changed significantly over the period of the study.

In conclusion, this case study has a purpose that is more methodological in nature than causatively focused. Basu et al (2017) ask the question, “How do we assess the ‘...the Health Impact of Large-Scale Public Policy Changes...?’” This case study answers that question by demonstrating that one can adopt a micro-level, case study approach and simply advance one step at a time. Nevertheless, this case study has documented the positive impact of selected policy changes, once implemented, in: 1) Increasing access to pediatric hospitalizations for children; 2) Narrowing the differentials in pediatric hospitalization expenditures between uninsured and insured families; 3) Sizable reducing drug markups for hospitals; and 4) Increasing the proportion of the total costs that is spent on medical services. Our findings provide a new piece of empirical evidence showing key outcomes of health policy changes implementation that have been occurring in China over recent years. Our findings also confirm that the ongoing efforts of the public sector in China to reduce the number of uninsured children in the country may be having an effect. It demonstrates direct linkages between policy change and improved pediatric health outcomes in China. Positive findings such as these can trigger 100% of geographic areas in China to immediately implement these two policies - an outcome that has not yet occurred.

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