



Reliability and validity of an instrument to assess pediatric inpatients' experience of care in China

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Background: The Child Hospital Consumer Assessment of Healthcare Providers and Systems (Child HCAHPS) is a standard instrument to measure pediatric inpatients' experience of care. Currently, no Chinese version of the Child HCAHPS exists for Chinese patients. Therefore, this study aimed to create a Chinese version of the Child HCAHPS and investigate its validity and reliability in a Chinese setting.

Methods: Using the approach recommended in guidelines from the Agency for Healthcare Research and Quality for translating HCAHPS surveys, we produced a Chinese version of the Child HCAHPS. A two-month field test with seven hospitals across five provinces in China was performed to assess its validity. Construct validity was assessed using confirmatory factor analysis. We evaluated convergent validity by factor loading, average variance extracted (AVE), and construct reliability (CR). Cronbach's alpha and corrected item-total correlation (CITC) were used to reflect hospital-level unit reliabilities for the survey's item composites. The correlation of the measure score with the overall rating was calculated to evaluate criterion validity.

Results: An overall response rate of 63% was achieved, and 2,258 respondents completed the questionnaire. Confirmatory factor analysis showed a comparative fit index (CFI) of 0.905, a non-normed fit index of 0.886, and a root mean square error of approximation (RMSEA) of 0.089. Most items had factor loadings over 0.7. Cronbach's alpha coefficient on the overall level was 0.981, and all measures' CITC exceeded 0.6, demonstrating good to excellent hospital-level reliability of the composite and single-item measures. All composite measures had good to excellent internal consistency reliability (0.716 to 0.994). Item-to-composite correlation ranged from 0.510 to 0.997. Composite-to-composite correlations ranged from 0.488 to 0.997. According to the survey result, for all the 18 composite or single-item measures, mean top-box scores ranged from 56% ("Involving teens in care") to 87% ("Informed in Emergency Room").

Conclusions: The Chinese version of the Child HCAHPS demonstrated acceptable validity and reliability. The application of this tool can help benchmark ongoing healthcare improvement initiatives in China.

Keywords: Pediatric care; quality of healthcare; patient experience; surveys and questionnaires

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Introduction

Healthcare quality improvement collaborations and initiatives have been proliferated worldwide with aims to improve clinical processes and patient experience (1). Patient experience survey programs are necessary for monitoring quality of care, and they can provide meaningful and valuable information for quality improvement initiatives (2-4). Most patient experience surveys administered routinely in hospitals are restricted to adults, such as the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) in the US, the National Health Service Patient Survey Programme (NPSP) in the UK, and the Chinese Patient Experience Questionnaire (CPEQ) survey in China (5-8). Standardized questionnaires and methods used to measure children's experience in hospitals in different cultural contexts have been less investigated historically (9,10).

Due to the lack of evidence on patient-reported experiences relating to quality of pediatric clinical processes, both the HCAHPS and NPSP have developed complementary surveys for pediatric patients in the past decade. The Children and Young People's Patient Experience Survey (CYP)—part of the NPSP—was developed and implemented in 2014 (11). This survey is featured for its diverse patient populations sampled, which includes children aged 2 weeks to 7 years, children aged 8 to 11 years, and young people aged 12 to 15 years. However, diverse patient samples and corresponding questionnaires are accompanied by the additional burden of survey organization and administration, compared to the cost and use of a single and standardized survey instrument. Additionally, the possible difference between children's responses and their parents' responses also limits the application of CYP. The Child HCAHPS is another standardized survey assessing the experience of pediatric patients, and gathers data from parents and guardians; it was endorsed by the US National Quality Forum in 2015 (12). Although previous research has translated or directly adopted the Child HCAHPS in Belgium and Canada (13,14), there is still a lack of validated Chinese versions of survey instruments for pediatric patients to date. A significant advantage of the HCAHPS is that the Agency for Healthcare Research and Quality (AHRQ) has a public set of proven guidelines for translating HCAHPS surveys from English into a variety of languages in a cost-effective yet culturally competent manner. Thus, the Child HCAHPS can not only be measured and reported as much as the

widely used Adult HCAHPS, but it can also be translated into other languages with ensured quality.

In China, with the implementation of the two-child policy after January 2016, the increasing demand for pediatric care delivery is likely to be challenging for both regulatory bodies and children's hospitals (15). To address the lack of survey instruments to measure pediatric experience for quality improvement initiatives in China, the current study describes the translation of a Chinese version of the Child HCAHPS and primary results of the validation in a field test.

We present the following article in accordance with the STROBE reporting checklist (available at <https://dx.doi.org/10.21037/tp-21-130>).

Methods

Translating the child HCAHPS from English into Chinese

The Child HCAHPS survey was developed by the Center of Excellence for Pediatric Quality Measurement at Boston Children's Hospital, which was funded by the AHRQ and the Centers for Medicare and Medicaid Services (CMS). It has 62 items, including 39 patient experience items that could be categorized into 18 composite and single-item measures. As a publicly available standardized survey of pediatric inpatient experience, the Child HCAHPS demonstrated good to excellent hospital-level reliability in a national field test in US hospitals (12).

Based on the guidelines and recommendations from the AHRQ for the translation of the HCAHPS surveys (16), we produced a Chinese version of the Child HCAHPS. Two simultaneous translators and two translation reviewers formed a translation team to ensure the quality and cultural appropriateness of the translated version. Both translators and translation reviewers were native speakers of Chinese and proficient in reading and writing English. Both had a medical degree from a medical college in China and at least 5 years of work experience in the health services research area. The translation process was as follows. First, we provided the translators and reviewers with the Chinese survey materials of the HCAHPS, which enabled them to check for and continue to use standardized translations for response scales and other text elements that are common across surveys. Background information on the translation task was also provided to help them better understand the Child HCAHPS. Second, we obtained two independent forward translations of the Child HCAHPS in Chinese from

each translator, while the linguistic and cultural relevance of the translations were reviewed by the translation reviewers. Third, the translators and reviewers formed a committee to review and finalize the wording of the translated Chinese survey materials. Any issues or problems were resolved by discussion until a consensus was reached by the committee.

The translation team replaced two items regarding the child's ethnicity and one item regarding the respondent's education based on localized questions and answers in the Chinese context. For the child's ethnicity, the top five ethnic groups in China were retained in the questionnaire, which included Han, Zhuang, Hui, Manchu, and Miao. All the other ethnic minorities were grouped as a separate option. The survey item regarding preferred language was dropped because it was unsuitable for the Chinese context. Considering alignment with the English version of the Child HCAHPS, we retained the direct Chinese translation of those dropped or replaced items in the translation version rather than applying it in the field test. For the final formatted Chinese version of the Child HCAHPS, please refer to [Supplementary file 1](https://cdn.amegroups.cn/static/public/10.21037tp-21-130-1.pdf) (available online: <https://cdn.amegroups.cn/static/public/10.21037tp-21-130-1.pdf>). The reconcile translation record master table is presented in [Supplementary file 2](https://cdn.amegroups.cn/static/public/10.21037tp-21-130-2.xlsx) (available online: <https://cdn.amegroups.cn/static/public/10.21037tp-21-130-2.xlsx>).

Pilot hospitals

We conducted a field test using the Chinese version of the Child HCAHPS in seven hospitals across five provinces in China. The pilot hospitals included one National Clinical Research Center for Child Health, two regional free-standing children's hospitals, and four general hospitals with a pediatric ward.

Patients

We obtained the discharge patient list from the hospital administrative department to identify potentially eligible patients. Children aged 17 years or younger with at least one overnight stay in the hospital and their parents/guardians were selected as per the eligibility criteria for determining whom to include in the survey.

The exclusion criteria were as follows: patients discharged without doctor permission, patients discharged to hospice care, patients who did not have parents/guardians, healthy newborns, patients discharged with a psychiatric principal diagnosis, and observation patients.

Sample size

The original English Child HCAHPS demonstrated good to excellent hospital-level reliability at 300 responses per hospital in the US. Thus, we aimed to obtain at least 300 completed questionnaires per hospital in the multi-site field test to achieve reliability, following the requirement for administering the Child HCAHPS survey based on the AHRQ's guideline (17). Due to the limited number of pilot hospitals, we attempted to obtain as many complete questionnaires as possible; thus, we conducted a census of all the eligible discharges in the hospitals rather than drawing a random sample of them.

Survey administration

Surveys were conducted from August 1 to September 27, 2020. During eight consecutive weeks of data collection, we enrolled research assistants who visited the pediatric wards daily in each pilot hospital. The assistants invited all eligible patients and their parents to complete the survey using an online survey system on the day of discharge before they left the hospital. Respondents were asked to scan a QR code to access the electronic questionnaire using their mobile phone or the assistant's mobile phone; all the respondents were approached individually and guaranteed confidentiality. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Participation was voluntary and verbal consent was obtained from the respondents before the survey. Ethical approval was granted by the Peking Union Medical College (3332019087).

Statistical analysis

First, we described the demographic and sociological characteristics of the children and respondents. Second, construct validity was assessed using confirmatory factor analysis (CFA). We used the comparative fit index (CFI), non-normed fit index (NNFI), and root mean square error of approximation (RMSEA) to evaluate the discrepancy between our pilot data and the hypothesized model. The higher the CFI and NNFI, the better the model fit, with a cut-off score of 0.9 representing a good model fit. For the RMSEA, a score lower than 0.1 indicated an acceptable model fit. Because only 4.7% of children were aged 13 years or older, we excluded the dimension of "Involving teens in care" in the CFA. We evaluated convergent validity by factor loading, average variance extracted (AVE), and

Table 1 Overview of the sampled hospitals in China

Hospital name	Location	Setting	Completed surveys	Response rate
Pediatric sites				
Children's Hospital of Zhejiang University School of Medicine	Zhejiang	National	377	62%
Beijing Jingdu Children's Hospital	Beijing	Regional	321	66%
Liuzhou Children's Hospital	Guangxi	Regional	241	55%
Adult sites				
Sichuan Provincial People's Hospital	Sichuan	Regional	315	62%
Binchuan County People's Hospital	Yunnan	County	383	70%
Xiangyun County People's Hospital	Yunnan	County	315	61%
Ninger County People's Hospital	Yunnan	County	306	66%

construct reliability (CR).

Third, we conducted a hospital-level unit for quantitative reliability and validity testing. Cronbach's alpha and corrected item-total correlation (CITC) were used to reflect hospital-level unit reliabilities for the survey's item composites. The correlation of the measure score with the overall rating was calculated to evaluate criterion validity. Fourth, we calculated the item-to-composite correlations, internal consistency reliability, and composite-to-composite correlations for additional testing.

All data analyses were generated using SPSSAU software (QingSi Technology Ltd., Beijing, China), using a two-sided significance test ($P < 0.05$).

Results

From August to September, 2020, we conducted a survey in seven hospitals across five provinces. Of the seven hospitals, six hospitals received at least 300 completed questionnaires and met the recommended minimum number of complete questionnaires for analysis and reporting. Two free-standing children's hospitals and four pediatric wards within a general hospital were included in the study. The location, setting, completed surveys, and response rates from each site are listed in *Table 1*. The overall response rate was 63%, the highest was 70%, and the lowest was 55%.

The general characteristics of the children and respondents are presented in *Table 2*. Over 60% of patients were aged ≤ 4 years and 59% were girls. The majority of patients were of Han ethnicity (73.4%) and had excellent or very good health (68.4%). Most respondents (63.3%)

were aged < 35 years, and 51.2% had an education level of high school graduate or lower. Most respondents were the children's mothers (65.8%), and the patients were most likely to be discharged on a Monday (17.9%) or Friday (17.8%).

The CFA model fit showed CFI=0.905, NNFI=0.886, and RMSEA=0.089. *Table 3* shows the factor loading, AVE, and CR of the composite measures. Most of the items had factor loadings over 0.7, and five had factor loadings of 0.195 to 0.419. Three composites related to communication about medicines and attention to safety and comfort showed unsatisfactory AVE (< 0.5) and CR (< 0.7).

The Cronbach's alpha coefficient on the overall level was 0.981, and the CITC for all measures exceeded 0.6, which demonstrated good to excellent hospital-level reliability of the composite and single-item measures, as presented in *Table 4*. Of the 17 composite or single-item measures, 13 had significant positive correlations with the overall rating of the hospital, with the strongest correlation of 0.944 for child comfort and correlations ranging from 0.419 to 0.938 for other measures.

Table 5 presents the internal consistency reliability using Cronbach's coefficient. All the composite measures had good to excellent internal consistency reliability, ranging from 0.716 to 0.994. The item-to-composite correlation ranged from 0.510 to 0.997. The "Involving teens in care" composite had a low item-to-composite correlation, possibly due to each item reflecting distinct processes of care, although they are conceptually related. The composite-to-composite correlations ranged from 0.488 to 0.997, and at the hospital level, each composite measure had

Table 2 Child and respondent descriptive characteristics (N=2,258)

Variable	%
Child age, years	
0	25.7
1 to 4	38.8
5 to 8	20.9
9 to 12	9.9
13 to 17	4.7
Child gender	
Female	41.0
Male	59.0
Child ethnicity	
Han	73.4
Zhuang	5.4
Hui	0.7
Manchu	0.4
Miao	0.8
Other ethnic minority	19.3
Child global health status	
Excellent	33.7
Very Good	34.7
Good	19.3
Fair	11.3
Poor	1.0
Respondent age, years	
<25	10.3
25 to 34	53.0
35 to 44	29.4
≥45	7.3
Respondent education	
Primary school or less	6.7
Junior high school	24.1
High school graduate or GED	20.4
Some college or 2-year degree	19.8
4-year college graduate	24.5
More than 4-year college degree	4.5

Table 2 (continued)

Table 2 (continued)

Variable	%
Respondent relationship to child	
Father	25.8
Mother	65.8
Other	8.4
Day of discharge	
Monday	17.9
Tuesday	12.6
Wednesday	15.4
Thursday	17.1
Friday	17.8
Saturday	9.9
Sunday	9.3

GED, General Educational Development.

strong correlations with each other, except for “Involving teens in care,” as shown in *Table 6*.

According to the results of the test survey, for all the 18 composite or single-item measures, mean top-box scores ranged from 56% (“Involving teens in care”) to 87% (“Informed in Emergency Room”). The best-performing composites pertained to “Informed in Emergency Room” (87% in top box), “Communication about medicines” (86% in top box), and “Privacy with providers” (79% in top box). Meanwhile, the worst-performing composites dealt with “Involving teens in care” (56% in top box), “Quietness of hospital room” (58% in top box), and “Child comfort” (61% in top box).

Discussion

Several HCAHPS surveys implemented by the US CMS are available in Cantonese, Korean, Mandarin, Portuguese, and Russian. The Child HCAHPS has only been available in English and Spanish until now, and now the Chinese version has been presented in our research. We examined the transferability of the Child HCAHPS to the Chinese context through a pilot study conducted in seven hospitals in China. The Chinese version of the Child HCAHPS, which was produced in this study, demonstrated acceptable construct and criterion validity, as well as satisfactory reliability.

Table 3 Confirmatory factor analysis of the composite measures

Item number	Topic, composite measures and item	Factor loading	AVE	CR
	Communication with Parents			
	Nurse-parent communication		0.833	0.937
15	Nurses listened carefully to parent	0.908		
16	Nurses explained to parent in easy-to-understand way	0.940		
17	Nurses treated parent with courtesy and respect	0.884		
	Doctor-parent communication		0.918	0.971
18	Doctors listened carefully to parent	0.969		
19	Doctors explained to parent in easy-to-understand way	0.953		
20	Doctors treated parent with courtesy and respect	0.953		
	Communication about medicines		0.394	0.681
6	Asked about child's prescription medicines	0.300		
7	Asked about child's over-the-counter medicines	0.334		
40	Provider explained how to take discharge medicines	0.787		
41	Provider explained side effects of discharge medicines	0.830		
	Informed about child's care		0.752	0.858
24	Providers kept parent informed	0.839		
26	Providers gave parent enough information about test results	0.898		
	Preparing to leave hospital		0.590	0.875
37	Provider asked parent about concerns about readiness to leave	0.710		
38	Provider talked with parent about care after discharge	0.659		
42	Provider explained when child can resume regular activities	0.852		
43	Provider explained symptoms or problems to look for after discharge	0.864		
44	Parent given written information about symptoms or problems to look for after discharge	0.757		
	Communication with children			
	Nurse-child communication		0.748	0.898
9	Nurses listened carefully to child	0.852		
10	Nurses explained to child in easy-to-understand way	0.899		
11	Nurses encouraged child to ask questions	0.849		
	Doctor-child communication		0.808	0.926
12	Doctors listened carefully to child	0.910		
13	Doctors explained to child in easy-to-understand way	0.913		
14	Doctors encouraged child to ask questions	0.879		
	Involving teens in care		N/A	N/A
45	Providers involved teen in discussions about care	N/A		
46	Provider asked teen about readiness to leave the hospital	N/A		
47	Provider talked with teen about care after leaving the hospital	N/A		

Table 3 (continued)

Table 3 (continued)

Item number	Topic, composite measures and item	Factor loading	AVE	CR
	Attention to safety and comfort			
	Mistakes and concerns		0.276	0.386
30	Providers checked child's identity before giving medicines	0.745		
31	Providers told parents how to report mistakes	0.244		
	Child comfort		0.355	0.542
22	Providers asked about things a family knows best about child	0.419		
23	Providers talked and acted age-appropriately	0.943		
36	Hospital had things available that were right for child's age	0.195		

AVE, average variance extracted; CR, construct reliability.

Table 4 Hospital-level unit quantitative reliability and validity testing

Composite and single-item measures	Items, n	Corrected item-total correlation	Correlation of measure score with overall rating
Communication with parents			
Nurse-parent communication	3	0.925	0.863*
Doctor-parent communication	3	0.921	0.784*
Communication about medicines	4	0.868	0.680
Informed about child's care	2	0.950	0.905**
Privacy with providers	1	0.943	0.830*
Preparing to leave hospital	5	0.971	0.896**
Informed in emergency room	1	0.940	0.896**
Communication with children			
Nurse-child communication	3	0.942	0.938**
Doctor-child communication	3	0.989	0.927**
Involving teens in care	3	0.648	0.445
Attention to safety and comfort			
Mistakes and concerns	2	0.984	0.869*
Call button	1	0.932	0.831*
Child comfort	3	0.931	0.944**
Child pain	1	0.932	0.737
Hospital environment			
Cleanliness of hospital room	1	0.930	0.840*
Quietness of hospital room	1	0.702	0.419
Global Rating			
Overall rating	1	0.875	–
Recommend hospital	1	0.800	0.856*

*, P<0.05; **, P<0.01.

Table 5 Hospital-level item-to-composite correlations and internal consistency reliability

Composite and item	Correlation	Cronbach α
Communication between you and your child's nurses		0.985
Nurses listened carefully to parent	0.965	
Nurses explained to parent in easy-to-understand way	0.997	
Nurses treated parent with courtesy and respect	0.966	
Communication between you and your child's doctors		0.994
Doctors listened carefully to parent	0.988	
Doctors explained to parent in easy-to-understand way	0.994	
Doctors treated parent with courtesy and respect	0.995	
Communication about your child's medicines		0.919
Asked about child's prescription medicines	0.756	
Asked about child's vitamins, herbal medicines, and over-the-counter medicines	0.863	
Provider explained how to take discharge medicines	0.932	
Provider explained side effects of discharge medicines	0.806	
Keeping you informed about your child's care		0.954
Providers kept parent informed	0.913	
Providers gave parent enough information about test results	0.913	
Preparing you and your child to leave hospital		0.988
Provider asked parent about concerns about readiness to leave	0.989	
Provider talked with parent about care after discharge	0.973	
Provider explained when child can resume regular activities	0.986	
Provider explained symptoms or problems to look for after discharge	0.992	
Parent given written information about symptoms or problems to look for after discharge	0.973	
How well nurses communicate with your child		0.981
Nurses listened carefully to child	0.991	
Nurses explained to child in easy- to-understand way	0.955	
Nurses encouraged child to ask questions	0.939	
How well doctors communicate with your child		0.955
Doctors listened carefully to child	0.976	
Doctors explained to child in easy-to-understand way	0.927	
Doctors encouraged child to ask questions	0.954	
Involving teens in care		0.758
Providers involved teen in care	0.510	
Provider asked teen questions about readiness to leave	0.615	
Provider talked with teen about care after discharge	0.922	

Table 5 (continued)

Table 5 (continued)

Composite and item	Correlation	Cronbach α
Preventing mistakes and helping you report concerns		0.716
Providers checked child's identity before giving medicines	0.587	
Providers told parents how to report mistakes	0.587	
Helping your child feel comfortable		0.854
Providers asked about things a family knows best about child	0.756	
Providers talked and acted age-appropriately	0.915	
Hospital had things available that were right for child's age	0.683	

Table 6 Hospital-level composite-to-composite correlations

Composites	1	2	3	4	5	6	7	8	9
1 Communication between you and your child's nurses	1								
2 Communication between you and your child's doctors	0.983**	1							
3 Communication about your child's medicines	0.882*	0.886*	1						
4 Keeping you informed about your child's care	0.982**	0.936**	0.840*	1					
5 Preparing you and your child to leave hospital	0.997**	0.973**	0.871*	0.980**	1				
6 How well nurses communicate with your child	0.909*	0.844*	0.627	0.938**	0.921**	1			
7 How well doctors communicate with your child	0.962**	0.905*	0.757	0.976**	0.973**	0.980**	1		
8 Involving teens in care	0.628	0.703	0.488	0.494	0.638	0.545	0.560	1	
9 Preventing mistakes and helping you report concerns	0.965**	0.904*	0.812*	0.992**	0.968**	0.952**	0.979**	0.491	1
10 Helping your child feel comfortable	0.936**	0.864*	0.767	0.959**	0.951**	0.957**	0.978**	0.537	0.985**

*, P<0.05; **, P<0.01.

For fielding the survey, the AHRQ recommends drawing a random sample of eligible monthly discharges as the basic sampling procedure. In our trial in Chinese settings, we conducted a census and included all eligible discharges in the survey to ensure a sufficient number of responses. Compared to the US National Field Test of the Child HCAHPS (12), the overall response rate in our study (63%) was much higher than that of the US (17.1%), but lower than the overall response rate in Belgium (90.99%) (12). This may be mainly due to our face-to-face mode for data collection, which usually gains higher response rates than mail or telephone approaches. In addition, we believe that the electronic questionnaire and online survey system helped improve the participation of hard-to-reach

groups in our trial, as demonstrated by the similar tablet administration in Japan and the US (18-20).

In this pilot study, we distributed surveys to parents of patients on the day they were discharged, rather than adopting the HCAHPS, which recommends data collection modes that initiate surveys after discharge by mail or telephone. This timeframe difference was determined by the culture and usual behavioral differences between China and the US. The traditional survey approach by mail is associated with difficulty in reaching the target parents or guardians in China because residents prefer to use the express delivery service rather than the post system in their daily life, while the express delivery service would be costly for massive and large-scale surveys in reality. The telephone

approach was also not selected in our pilot, because unwanted or nuisance calls are a social problem in China, resulting in many complaints. In other words, the telephone approach may be unsuitable for a surveys in a Chinese setting.

Regarding the characteristics of the sample population, 85.4% of the children in the present study were less than 8 years and 14.6% were over 8 years. The low percentage of participants over 8 years may reflect the unique medical care-seeking process of pediatric patients in China. Due to the gap between supply and demand of pediatric care resources (15), the parent or guardian of a teenager may select the general hospital rather than the more crowded children's hospital as their first healthcare utilization choice. The result suggests that patients less than 8 years were the main customers in children's hospitals in China.

Regarding the exclusion criteria, we revised the survey so that it corresponded to the Chinese healthcare system, as recommended by the AHRQ. For example, the "No-Publicity" patients were not adopted in the exclusion criteria list, which is recommended by the AHRQ, as there is a lack of similar regulation in Chinese hospitals. Additionally, the "Court/Law enforcement" patients were not adopted either because this patient group is designated for hospitalization only in an independent judicial hospital system. Meanwhile, some new criteria to reflect the situation in China were added in our survey; for example, we excluded "patients discharged without doctor's permission," which is common in China and may reflect a significant cultural difference compared with the US.

To validate the composite measure, two aspects need attention. First, two items in the "Communication about medicines" had low composite loadings; that is, the items did not fit the dimension well. According to our field study and interviews with the respondents in China, some patients and their parents were unable to distinguish between prescription medicines and over-the-counter medicines; thus, they felt confused and were unable to give accurate answers about the item related to communication about medicines. This result suggests that a modification of the item related to communication about medicines would be necessary for the Chinese setting. Similar research in the Belgian context also revealed this medicine-related, potentially cultural-specific difference (13). Second, two items in the "Attention to safety and comfort" had low composite loadings. One was "Providers told parents how to report mistakes," and the other was "Hospital had things available that were right for child's age." The item

measuring "Report mistakes" was desirable in terms of knowing whether the provider cares about safety issues from the perspective of the patient; however, on conceptual grounds, this item may not be suitable for organizing into the composite, as the other item in the composite mainly focuses on the patient identity check by the provider. The item "Hospital had things available that were right for child's age" had the lowest composite loadings in all items, and this is consistent with previous research in the US and Belgium (12,14). We suggest that this item be reported as a separate item rather than organized into the current composite.

The hospital-level quantitative reliability and validity test results suggest that the Chinese version of the Child HCAHPS could be a valuable instrument for quality improvement initiatives in pediatric settings in China. Most composite indicators can be directly used to measure and distinguish performance at the hospital level. In addition, some composites should be used with caution (e.g., Involving teens in care) or be modified to make them more context-specific and fit for the domestic culture. This dedicated pediatric survey to measure and track patient experience would provide highly valued evidence for the provider (2,21).

Limitations

This research had some limitations. First, neither the translators or translation reviewers had any experience living in the US, nor were they able to gain insight into the regional variations in the usage of Chinese language in the US. As non-certified professional translators, they met the required qualifications for the translator and reviewer but did not reach the desirable qualifications recommended by the AHRQ, and this may have influenced the quality of the translation. Second, no case-mix adjustment procedures were applied in the data analysis because this research was aimed at instrument validation rather than hospital performance comparison. In light of the future large-scale application of the Chinese version of Child HCAHPS, an appropriate case-mix adjustment methodology would be necessary for further research. Third, the generalization of the findings might be limited, as seven hospitals in only five Chinese Provinces were included. In the future, a larger sample that covers hospitals from other provinces of China would produce more representative evidence for validation of the Chinese version of the Child HCAHPS and re-test reliability of the survey. Fourth, based on the limited sample

size of the field test, we were unable to obtain enough responses to analyze the differences between children's responses and their parents' or guardians' responses. Although including children and young people themselves as respondents in the surveys is recommended in the English country context (11), whether it is feasible in the Chinese context needs to be further examined. Additionally, underrepresented minority groups may be less likely to participate in surveys in the US (22); similarly, such groups need to be identified in China.

Conclusions

The Child HCAHPS and its Chinese edition produced by our research can be a valuable and reliable instrument for measuring the pediatric experience of hospital care in China. It provides a validated tool for assessing hospital performance. The application of this tool in hospitals can benchmark ongoing healthcare improvement initiatives in China. The standardized methodology and comparable survey results would not only be beneficial for hospital internal quality improvement work but also contribute to external coordination of cross-nation pediatric quality research worldwide.

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