Brazilian Portuguese translation, cross-cultural adaptation, and content validation of the pediatric lower urinary tract symptom score

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ABSTRACT

Background: Early screening instruments for professionals are important to reduce the cost and time of diagnosing pediatric lower urinary tract dysfunction. This study aimed to translate, cross-culturally adapt, and validate pediatric lower urinary tract symptom scores.

Methods: This methodological study was conducted in 2019 in two phases: translation and cross-cultural adaptation, and content validation. In the first phase, we used translators, specialists, and 30 parents of children with voiding dysfunction. In the second phase, validation was performed by 11 pediatric urology specialists.

Findings: The instrument was translated and adapted to Brazilian Portuguese and presented an excellent level of verbal comprehension. Further, the instrument presented a good content validity index >0.8 for all items, except for the nomenclature and clarity of two items, as indicated by the Cronbach's alpha value of 0.75 for internal consistency.

Discussion: The final version showed semantic, idiomatic, experiential, and conceptual equivalence with the original instrument, indicating that it is adequate for other assessments of psychometric qualities.

Practice implications: The translation and adaptation of an important instrument for diagnosing lower urinary tract dysfunction in children to other countries helps nurses identify the disease early and monitor the treatment.

Purpose

Lower urinary tract dysfunction (LUTD) refers to an anatomical and/or functional change in the natural process of urination from storage to emptying. When addressing the manifestations of urinary tract morbidity in children, it is impossible to dissociate the anatomical and physiological aspects from a psychological aspects (Andersson, 2014; Veloso et al., 2016). A child's emotional state directly interferes with the emergence and worsening of LUTD (Veloso et al., 2016; Zhao et al., 2015). They may present with nocturnal enuresis after emotional trauma or stress, such as the loss of their parents or divorce (de Azevedo et al., 2014). Therefore, this condition compromises the quality of life of affected children and their caregivers (Alazab et al., 2015; Vasconcelos et al., 2013).

The worldwide prevalence of pediatric lower urinary tract symptoms (LUTS) is estimated to be 44.3% (Jankauskienė et al., 2014). In Brazil, it is estimated that 21.8% of children between 6 and 12 years old have LUTS (Vaz et al., 2012). Considering the risk of LUTD becoming chronic and persisting into adulthood, early diagnosis is essential (Bauer et al., 2015; de Azevedo et al., 2014; Veloso et al., 2016). As an aid in health diagnosis, screening instruments standardize, classify, and organize symptomatologic parameters that are often not included in complementary examinations (Bolsoni & Zuardi, 2015). These instruments are important tools for professionals performing early identification based

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symptoms, preventing harmful behaviors, and contributing to improving the quality of life of the affected population (Bolsoni & Zuardi, 2015).

Akbal et al. (2005) created a symptom score to assess pediatric lower urinary tract dysfunction called the pediatric lower urinary tract symptom score (PLUTSS), which has good internal consistency (Cronbach's alpha = 0.827) and an intraclass correlation index of 0.997 (95% CI 0.994–0.999) ($p < 0.0001$) (Akbal et al., 2014). The PLUTSS is a self-administered questionnaire for parents or legal guardians of children with suspected LUTD that allows the quantification of symptoms, simplifies diagnosis, and reduces diagnosis costs and time (Akbal et al., 2014; Somoza Argibay et al., 2017), thus contributing to holistic care. Currently, children with LUTD are assessed at the age of 5 years using the dysfunctional voiding scoring system (DVSS) or urodynamic studies (Calado et al., 2010; Valente et al., 2014; Miranda et al., 2022). Although DVSS is the only instrument validated for the Brazilian language, PLUTSS shows better results in psychometric assessment (Jankauskienė et al., 2014; Silva Filho et al., 2020; Vaz et al., 2012).

The use of a screening instrument in primary healthcare and specialized services by physicians and nurses could reduce the cost and time of diagnosing LUTD pathology, constituting an important scientific investment with considerable social impact. Therefore, this study aimed to translate, adapt, and validate the PLUTSS in the Brazilian context.

Design and methods

To identify and assist children with urinary dysfunction, the PLUTSS was created as an assessment instrument in Turkey, which justifies the methodology of cross-cultural adaptation and validity of this instrument for use in children aged 4–10 years, similar to the original instrument. This adaptation was validated with 30 mothers of children with primary problems and 11 experts from various regions of Brazil. This study was conducted in Pernambuco, Brazil, from February to December 2019.

Cross-cultural adaptation

The adaptation was performed in five stages: translation from English to Brazilian Portuguese, synthesis of translations, back-translation, expert committee analysis of the instrument's content, latent trait assessment, and pre-test verbal comprehension verification (Beaton et al., 2000).

The PLUTSS questionnaire was initially translated by two bilingual Brazilian translators to accurately reflect Portuguese-language specificities. One of the translators was an expert in urology and produced a translation that had more reliable equivalence to the original from a measurement perspective, whereas the second translator had no training in the health field. Two translations (T1 and T2) emerged as the products of the first stage. A third translator, native, bilingual, and from the health area, synthesized two translations of the original instrument. The translator acted as a mediator of their divergence, producing a synthesis of these translations (S1). Based on the synthesis of the translated questionnaire and the total ignorance of the original version, two bilingual translators, with English as their native language and without training in the health area, independently translated the questionnaire back to the original language (BT1 and BT2). The validity verification process ensures that the translated version accurately reflects the content of each item in the original instrument.

The expert committee included a methodologist, a nurse with a PhD in health sciences, an expert in urinary incontinence, a linguist, and the translators who participated in the previous stages (Liamputtong, 2011; Souza, 2019). At this stage, a pre-final version was developed that was later submitted for verification of verbal comprehension. The work developed by the committee aimed to assess the semantic, idiomatic, experiential, and conceptual equivalence between the original and adapted versions.

Face validity

For this, a pilot study was conducted in which the adapted instrument was applied to a sample of 30 mothers with the target population's characteristics according to the method suggested by Beaton et al. (2000), with the aim of testing, understanding, and reducing the chances of measurement errors (Aquino et al., 2012). Mothers were invited from nursing consultations with their children. At this time, the researchers explained the research to them and asked for their consent to participate in it.

This study was conducted at a referral center for the treatment of children with physical disabilities. At this stage, the pre-final version was administered to a representative sample of the instrument's target population, comprising 30 mothers of children with urinary symptoms. The interviews were conducted by a single interviewer to ensure a minimum standard of conduct during the application of the research instrument.

After reading each question, participants were asked, "Did you understand what was being asked?", with optional answers such as "I understood" and "I did not understand." The obtained data were analyzed using the concordance rate. Items with a misunderstanding rate $\geq 20\%$ were reassessed for a new version of the instrument.

Content validity

Eleven experts participated in this stage, including one urologist specializing in adult care, five pediatric urologists, and five enterostomal therapy nurses. At this stage, the research team analyzed professional curricula through a platform maintained by the Brazilian National Council for Scientific and Technological Development (CNPq- *Conselho Nacional de Desenvolvimento Científico e Tecnológico*) to verify whether the expert met the following inclusion criteria: thesis or dissertation in the area of interest, undergraduate thesis or specialization in the area of interest, participation in groups/projects in the area of interest, teaching experience in the area of interest, practical work experience in the area of interest, supervisor of academic works in the area of interest, author of two articles published in journals in the area of interest, and participation in examining panels of works in the area of interest. Experts who achieved five points on these assessment items were selected (Teles et al., 2014).

The instrument items were assessed for appropriate nomenclature, clarity, objectivity, relevance, and applicability. A Likert-type scale was adopted for this stage to assess the items as (1) inadequate, (2) slightly adequate, (3) adequate, and (4) completely adequate.

Content validity was adopted because of the possibility of changes in construct materialization resulting from translation and cross-cultural adaptation, considering that the assessments were made by experts from different regions of Brazil. The experts' assessment results were analyzed using the content validity index (I-CVI) (Lynn, 1986) and decision-making according to the standards of Polit et al. (2007), considering the Polit assessment standard: I-CVI ≥ 0.80, excellent; I-CVI between 0.60 and 0.79, good; and I-CVI ≤ 0.59, poor, being the item excluded.

Verification of the internal consistency of the translated instrument

Among reliability criteria, internal consistency represents an important measurement property for instruments that assess a single construct using various items (Terwee et al., 2007), such as the PLUTSS.

For convenience, the sample was non-probabilistic and comprised 30 mothers of children registered at the aforementioned reference center. To verify internal consistency, Cronbach's alpha coefficient, which is expressed as a number between 0 and 1, was used. For the instrument to be considered reliable, Cronbach's alpha value of 0.70 was adopted as the most appropriate (Field, 2009; Nunnally & Bernstein, 1994), and for the corrected item-total correlation, the ≥ 0.2 criterion was adopted

(Kline, 1993).

Statistical analysis was performed using the Statistical Package for the Social Sciences, version 25, which allowed for a descriptive analysis of the reliability coefficient, the CVI, and the instrument's internal consistency.

Ethical considerations

Ethical approval was obtained from the Research Ethics Committee of the university hospital and institutional permission was obtained from the Association for Assistance to Children with Disabilities to conduct the study. The study was carried out in accordance with the principles of the Declaration of Helsinki and Resolution 466/12 of the National Health Council/Ministry of Health of Brazil (Approval number: 2,987,035). The study was initiated after obtaining verbal and written consent from the participants.

Results

Cross-cultural adaptation

During the cross-cultural adaptation stage, modifications were made to the Brazilian version of the scale. The original instrument (English language) was developed to be self-administered; however, considering the diversity of the Brazilians' education (mainly public health system users), it was necessary for the instrument to be used by health professionals, which caused a change in pronoun from "my son" to "your son" in items 5 to 13.

Face validity

In the face validity process, all mothers understood the instrument items, and it was not necessary to modify any terms for an adapted version. Table 1 presents the demographic characteristics of participants and their children. The mean ages of the mothers and children were 32.8 years [Standard Deviation (SD) = 6.7] and 8 years (SD = 2.8), with age extremes of 24 and 54 years and 5 and 12 years, respectively.

Regarding the education of mothers, there was a higher frequency of those who studied from 5th to 8th grade (40%), whereas the highest frequency of children in the sample were illiterate (40%). Regarding the

Table 1
Characterization of mothers and children with voiding dysfunction.

Variable	Mothers		Children	
	n (30)	(%)	n (30)	(%)
Age group				
5–8	–	–	16	56.7
9–12	–	–	14	43.3
24–35	20	66.7	–	–
≥36	10	33.3	–	–
Sex				
Female	30	100	13	43.3
Male	–	–	17	56.7
Ethnicity				
White	19	63.3	21	70.0
Black	7	23.3	5	16.7
Brown	4	13.3	4	13.3
Education				
Illiterate			12	40.0
1st to 4th grade	3	10.0	7	23.3
5th to 8th grade	12	40.0	11	36.7
Incomplete high school	10	33.3	–	–
Incomplete higher education	3	10.0	–	–
Complete higher education	2	6.7	–	–
Marital status				
Married	14	46.7	–	–
Divorced	2	6.7	–	–
Single	14	46.7	–	–

marital status of parents, equal frequencies of married and single parents were observed in the sample (46.7%).

Content validity

The content validity was assessed after face validation. Table 2 presents the demographic characteristics of 11 experts who participated in the content validity assessment committee.

The scale's content validity index (S-CVI/Area), measured using the mean of the items, was calculated at 0.86 (Table 3). All items had a CVI > 0.72, indicating that the experts approved all 14 items of the instrument. The interrater agreement (IRA) was classified as strong (IRA: 0.93).

Internal consistency check

The Cronbach's alpha for the translated instrument was 0.75, which indicated good internal consistency. Moreover, based on the analysis of item-total correlations, the corrected item-total correlation coefficients were consistently high for most items (>0.30), indicating their importance for instrument consistency. The same was not true for items 8, 9, 10, and 11, which showed low item-total correlation coefficients. In the inter-item analysis, it was observed that items 4, 8, 9, 10, and 11 had values below 0.15; however, we opted to retain them because of their importance for the identification of LUTS; even if they were excluded, they would not impact the final Cronbach's alpha. Additionally, item 4 complemented item 3 (Table 4).

Discussion

A cross-cultural adaptation process is a combination of the components of literally translated words and phrases from one language to another and a meticulous harmonization process that considers a target population's cultural context and lifestyle (Gorenstein et al., 2016). The method used in this research (Beaton et al., 2000) ensured semantic equivalence between the original and adapted instruments, guaranteeing the denotative permanence of the words and emphasizing the valuable contribution of the expert committee in this process.

Regarding experimental equivalence, items on a given instrument sometimes describe common daily life experiences in a country or culture that are different from those of the country to which it is intended to adapt (Beaton et al., 2000; Gorenstein et al., 2016). For example, the expression "intermittent" that was used in the original instrument could lead to a misunderstanding when using the adapted version. Therefore,

Table 2
Characterization of the experts who participated in PLUTSS content validity.

Variable	n (11)	%
Age group		
30–44	4	36.4
≥45	7	63.6
Sex		
Male	7	63.6
Female	4	36.4
Profession		
Enterostomal therapy nurse	5	45.5
Pediatric urologist	5	45.5
Urologist	1	9
Time since graduation (years)		
10–20	5	45.5
21–40	6	54.5
Degrees		
Ph. D.	6	54.5
Master of Science	4	36.4
Expert	1	9.1
Experts' selection criteria score		
≤15	4	36.4
>15	7	63.6

Table 3

Content validity index according to item, scale, and agreement among the evaluators of the translated PLUTSS.

Assessments	Nomenclature	Clarity	Applicability	Relevance	CVI-I
Items					
Item 1: Does your child have urinary incontinence (peeing when not in the bathroom) during the day?	0.81	0.81	1.0	1.0	0.91
Item 2: If yes, what is the intensity?	0.81	0.81	0.9	0.9	0.86
Item 3: Does your child have urinary incontinence (peeing when not in the bathroom) at night?	0.81	0.81	0.9	1.0	0.88
Item 4: If yes, what is the intensity?	0.81	0.81	0.81	0.9	0.83
Item 5: Does your child go to the bathroom to pee?	0.81	0.9	0.81	0.81	0.83
Item 6: Does your child have to strain to pee?	0.9	0.9	0.81	0.81	0.86
Item 7: Does your child feel any pain when peeing?	0.9	0.9	0.81	0.81	0.86
Item 8: Does your child pee intermittently when in the bathroom (split urine stream)?	0.72	0.72	0.81	0.81	0.77
Item 9: Does your child have to go to the bathroom again to pee shortly after having done it?	0.81	0.81	0.81	0.9	0.83
Item 10: Does your child have to run to the bathroom when they feel like peeing?	0.81	0.9	1.0	1.0	0.93
Item 11: Can your child hold their pee by crossing their legs, squatting, or doing the "pee dance"?	0.81	0.9	0.9	0.9	0.88
Item 12: Does your child wet his/her clothes before reaching the bathroom?	0.9	0.9	0.9	0.9	0.90
Item 13: Does your child not defecate every day (constipation)?	0.72	0.72	0.81	1.0	0.81
Item 14: If your child has any of the symptoms mentioned above, does this affect your social or family life?	0.81	0.9	0.9	0.81	0.86
CVI-S/Ave					0.86
IRA					0.93

Table 4

Result of the analysis of item-total correlations and Cronbach's alpha for the translated PLUTSS.

Items	Scale average if an item is excluded	Scale variance if an item is excluded	Inter-item correlation	Corrected item-total correlation	Cronbach's alpha if an item was excluded*
Item 1	27.43	34.185	0.32	0.729	0.685
Item 2	28.23	33.082	0.33	0.781	0.676
Item 3	27.97	33.689	0.25	0.525	0.722
Item 4	29.40	39.352	0.13	0.324	0.749
Item 5	30.37	46.102	0.22	0.222	0.749
Item 6	29.50	34.397	0.33	0.626	0.700
Item 7	30.37	46.033	0.27	0.232	0.749
Item 8	30.33	47.747	0.10	0.000	0.761
Item 9	30.40	47.559	0.10	0.010	0.760
Item 10	30.43	47.220	0.14	0.059	0.757
Item 11	30.37	47.689	0.10	0.000	0.760
Item 12	30.20	44.855	0.22	0.451	739
Item 13	30.23	46.530	0.20	0.172	0.752
Item 14	29.47	40.671	0.30	0.628	0.716

* Cronbach's alpha for the global instrument was 0.75.

considering regional aspects and the diversity of the population's education assisted in outpatient clinics, an addition of the word "split urine stream" was required (item 8).

In this study, 100% of children with LUTD were accompanied by their mothers for consultation. This result is consistent with that of another study conducted in southeastern Brazil with caregivers of children with myelomeningocele undergoing urological treatment, where a frequency of 100% female caregivers was observed (Kós et al., 2016). Mothers usually take on the responsibility of caring for their sick child, acting as the main caregivers, which has also been highlighted by a study on the impact of an interdisciplinary approach on children and adolescents with LUTD (Colasante et al., 2016; de Azevedo et al., 2014),

because they experience their children's daily lives more intensely (Oliveira et al., 2018).

The age group of mothers was between 24 and 54 years, similar to that found in a study in southeastern Brazil, in which the age ranged between 26 and 52 years (Freitas et al., 2017). Considering that this study was conducted in northeastern Brazil, this result reflected statistical information on the behavior of births between 2006 and 2016, and a fall in the percentage of women $\leq$20 years old from 23.5% to 20.6% (IBGE, 2015 ; IBGE, 2016) reaffirmed the trend that Brazilian women are having children later in life (IBGE, 2015; IBGE, 2016).

The studied group presented an equal frequency (46.7%) for married and single parents, different from a study conducted with caregivers of children with special health needs, where a higher frequency was observed for married people (83%) (Rodrigues et al., 2018). This also alluded to the national trend of marriages, indicating that the northeast Brazilian region is second with the lowest rate of legal marriage. A child being raised by a single mother can have repercussions on various aspects of LUTD treatment and progression, especially when marital status is associated with education, working conditions, and income. Therefore, this should also be overseen in the nursing care provided to the dyad, in which nurses must use different strategies to contemplate the difficulties experienced by mothers and their children. It also reinforces the need for these children to receive specialized care from an enterostomal therapy nurse for safe guidance on indispensable adaptations between school and home environments. Furthermore, in this study, approximately 83.3% of mothers did not complete high school, which is different from the results of a study conducted in southeastern Brazil, in which 62.5% did not complete high school (Freitas et al., 2017).

The slow process of changing cultural patterns of sex has eased the traditional barriers to the entry of women into the labor market, reducing the fertility rate and continuously raising education levels in the last three decades; however, inequality in the population's education has regional characteristics. In the northeast, 52.6% of the Brazilian population did not complete elementary school in 2016 (IBGE, 2016), which should be reflected in the guidelines by health professionals to these caregivers, as the level of understanding is directly related to education and the manner of participation in their children's treatment needs clarification.

Of the total children who participated in this study, the highest frequency was of males ($n = 56.7\%$), which differed from some Brazilian studies that have reported a higher frequency of females (Lebl et al., 2016; Veloso et al., 2016). However, the results of our study were similar to those of another study conducted in Turkey (Akbal et al., 2014). The age of the children in this study ranged from 5 to 12 years, differing slightly from other studies conducted in the same region of Brazil and

another in Turkey (Akbal et al., 2014; Veloso et al., 2016). However, similarities in the mean age (8 years) with a study conducted in São Paulo, which presented an average of 7.9 years, were observed (Lebl et al., 2016). The children's age group in this study was determined similar to that used in the construction and validity of the original instrument.

The validity of an instrument adapted to another language and cultural reality must be established to ensure its recognition and acceptance. A valid and reliable instrument must be free of bias to avoid inaccurate estimates of the results (Chiwaridzo et al., 2017; Sikorskii & Noble, 2013). Content validity is an essential step, considering that abstract concepts, such as the symptomatology of pediatric patients, are sometimes verified at this stage. Therefore, the content validity in this study was assessed by experts; however, there is controversy about the number and criteria for their selection. The literature recommends a minimum of five (Lynn, 1986) and a maximum of 20 experts (Hardesty & Bearden, 2004); thus, 11 experts were assigned in the present study. Moreover, the selection of appropriate experts is crucial to ensure that content validity is properly assessed. Therefore, the experiences and qualifications of committee members must be considered (Alexandre & Coluci, 2011). The expert classification system (Teles et al., 2014) allowed the selection of a sample composed of professionals from all Brazilian regions, attributing greater precision to understanding the instrument and providing greater rigor and quality to the assessments, as observed by the high correlation between the results.

In the content validity process, it was necessary to use expert judges in the study area. Their experience in urology corresponded to an average of 22.27 years. The length of professional training, both medical and nursing, can be an indication of their relative maturity, considering the lived experiences that result in knowledge and aptitude over a certain period in a certain area. Although the literature considers the attributes of having a specialized body of knowledge and skill, broad experience in the field of practice, and highly developed levels of recognition as the definition of expertise (Jasper, 1994), there are no studies that relate the number of years of professional training experience as a defining characteristic; however, the time presented by the professionals who composed the group, in theory, is sufficient for them to gather the necessary attributes for this.

Expertise in the subject involves integrating knowledge with patient care experience, which is only possible through experience and professional action. Experts with experience in a patient's clinic can act in a reflective, planned, and systematic way to consistently assess the instruments (Pina Queirós, 2015). As for formal knowledge, here understood by a degree, 54.6% were Doctors of Philosophy, and 36.4% of the committee members were Masters of Science, having a degree sufficient to evaluate a measurement instrument with the peculiarities of the one analyzed here. Aggregating the opinions of experts from all Brazilian regions is essential for international instrument cross-cultural adaptation and validity, allowing the generalization of the analysis to other populations or contexts, considering the different experiences in the regions of the country (Leon, 2017).

Expert assessment showed that the PLUTSS is a relevant and valid content instrument for the construct that is to be assessed (voiding dysfunction in childhood) with excellent CVI when considering each item. Although a lower CVI for the nomenclature and clarity of two questions ("Does your child pee intermittently when in the bathroom (split urine stream)?" and "Does your child not defecate every day?") was observed compared to the others, considerable results were obtained.

The content validity was attested by a strong agreement on the reliability of the assessments. To assess the PLUTSS reliability, the internal consistency indicator was used to verify whether the instrument domains measured the same characteristics (Souza et al., 2017). As for the internal consistency measurement, evidence provided by Cronbach's alpha (0.75) suggested that all items measured the same characteristic; that is, removing any of them would not substantially improve internal

consistency. Although some items have a low item-total correlation coefficient, this does not change the PLUTSS reliability, considering that, in principle, it ranges from 0 to 1 (Ebel & Frisbie, 1986). However, the results of the present study suggest the need for continued research on the evaluation measure of stability over time to strengthen the findings of internal consistency.

Limitations and strengths

The results obtained showed that the PLUTSS instrument translated and adapted for Brazil has valid content, with good internal consistency, showing reliability for screening urinary dysfunction in children, constituting a useful tool to guide health actions in countries of Portuguese language. We recognize a limitation in the study design. The sample used consisted of mothers of children with dysfunction of neurological origin; therefore, the research should be extended to children with LUTD of other etiologies.

Implications to practice

The translation and adaptation of an important instrument for diagnosing lower urinary tract dysfunction in children to other countries helps nurses identify the disease early and monitor the treatment.

It constitutes a useful and practical tool to be used in the daily lives of nurses and health professionals who work in pediatric urology to guide health actions, thus individualizing the care provided to these patients.

PLUTSS can contribute to the systematic practice of pediatric urological care practiced by nurses in specialized outpatient clinics.

Conclusions

In this study, the PLUTSS was cross-culturally adapted, with a verbal comprehension assessment, which showed excellent results. Further, it was attested for the quality of the adaptation and an understandable and apparently viable version for use in the Brazilian population and other countries with similar sociocultural characteristics. The translated and adapted version of the PLUTSS for Brazil presented valid content, with good internal consistency, showing reliability for screening urinary dysfunction in children and constituting a useful tool to guide health actions, thus helping in customizing the care provided to these patients.

However, this initial validity in a controlled environment (i.e., from a sample of children with voiding dysfunction) limited the viability of results, thereby presupposing the continuity of research with larger samples for proper comparison of results (usability measurement), in addition to other reliability assessments by measuring stability over time and convergent and divergent validity with other questionnaires.

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CREDIT statement

Conceptualisation: The research Ideas and formulation of research goals were done by the Principal author: Jabiael Carneiro da Silva Filho.

Methodology: The methodology was developed and written by Jabiael Carneiro da Silva Filho with guidance from Prof. Isabel Cristina Ramos Vieira Santos.

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