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ORIGINAL PAPER

Clinical validation of the acute cystitis symptom score in the Kazakh language

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Summary

Background: *The Acute Cystitis Symptom Score (ACSS) is an internationally validated patient-reported outcome (PRO) tool for diagnosing and monitoring acute uncomplicated cystitis (AC) in women, available in several language versions. The current study reports the linguistic and clinical validation of the Kazakh version of the ACSS.*

Methods: *Linguistic validation followed internationally accepted guidelines for the cultural adaptation of PRO instruments. The current validation study included 100 Kazakh-speaking women. All respondents participated in cognitive debriefing to ensure clarity and comprehensibility of the translated PRO. Participants completed diagnostic Part A of the Kazakh version of the ACSS at initial admission and follow-up Part B at each follow-up visit. Descriptive statistics were used to summarise demographic characteristics. The comparative analysis included parametric and nonparametric tests where appropriate. Reliability of the Kazakh version of the ACSS was measured using Cronbach's alpha and split-half reliability. Diagnostic performance was assessed by sensitivity and specificity. Statistical significance was set at $p = 0.05$.*

Results: *Sixty-seven women with AC (mean age 39.24 ± 13.66 years) and 33 without evidence of urinary tract pathology (mean age 44.94 ± 17.99 years) were included in the Patient and Control groups, respectively. No significant demographic differences were observed between groups. Median scores in the "Typical" domain were significantly higher in Patients than in Controls (5.00 vs 0.00). Internal consistency was high for the "Typical" (Cronbach's $\alpha = 0.86$) and "QoL" ($\alpha = 0.91$) domains. Split-half reliability analysis showed a correlation coefficient of 0.65, a Spearman-Brown coefficient of 0.79, and a Guttman split-half coefficient of 0.77. The sensitivity and specificity of the Kazakh version of the ACSS, using the predefined cut-off value of 6 based on the "Typical" domain summary score, were 0.85 and 0.90, respectively.*

Conclusions: *The Kazakh version of the ACSS demonstrates good reliability and strong discriminative ability, supporting its use in the clinical assessment of AC in Kazakh-speaking women.*

KEY WORDS: *Acute cystitis symptom Score; Cystitis; Patient-reported outcome; Questionnaire; Women.*

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INTRODUCTION

Urinary tract infections (UTIs) are the most common bacterial infections in women. Each year, 10-13% of women seek medical care for acute UTIs (1). Nearly half of all women experience at least one acute UTI episode in their lifetime, and about one-third have their first symptomatic episode of UTIs by age 24 (2).

Although dysuria is a key symptom of *acute cystitis* (AC), it can also be associated with gynaecological disorders (3). The acute onset of dysuria in combination with frequent urination and urgency in the absence of vaginal discharge or other genital symptoms increases the likelihood of AC by more than 90% (4). Nevertheless, the symptoms suggestive of AC can be heterogeneous, and bacterial cystitis is not always the cause.

To date, no single universally accepted tool for the clinical diagnosis of AC has been established.

The *Acute Cystitis Symptoms Score* (ACSS) was developed and validated as a simple, standardised self-assessment tool for women to address this issue. It identifies and evaluates typical and differential symptoms of AC, assesses the resulting impairment of daily activities and quality of life, and helps to track changes in symptoms during therapy (5).

The ACSS was initially developed in the Uzbek language and simultaneously translated into Russian. It demonstrated high specificity and sensitivity in diagnosing AC among Uzbek- and Russian-speaking women in Uzbekistan (5). Subsequently, the ACSS was translated and validated in several other languages and implemented in clinical practice in many countries (5-18).

In addition, the ACSS was used in a retrospective study that included a mixed cohort of 517 women from various

countries (19). This study demonstrated the significant potential of the ACSS to collect and evaluate symptomatic data from patients speaking different languages. The data can be processed and investigated simultaneously with strong comparability across language versions, and therefore, the recent review suggested the ACSS as a valuable tool for *patient-reported outcome measure* (PROM) for both everyday practice and clinical studies (20).
We aimed to perform the linguistic and clinical validation of the Kazakh version of the ACSS among native Kazakh-speaking women in the Republic of Kazakhstan.

Materials And Methods

Study tool

Diagnostic Part A of the ACSS comprises 18 items arranged into the following four domains: "Typical" (six symptoms), "Differential" (four symptoms of other urogenital diseases), "Quality of Life" (three items on symptom impact) and "Additional" (five items on supplementary conditions). The first three domains use a 4-point Likert scale (0 to 3), while the "Additional" domain provides yes/no answer options.
The follow-up Part B of the ACSS includes the same items and domains as Part A and is preceded by a complementary "Dynamics" domain, which comprises a question about possible changes in the patient's symptoms and overall condition since Part A was last completed.

Process of translation

Since the ACSS was originally developed and comprehensively validated in Uzbek, the Uzbek version served as the source for the translation into the target Kazakh version.
The linguistic validation of the ACSS from Uzbek into Kazakh was conducted in accordance with internationally accepted guidelines (21). Cognitive interviews with 10 native Kazakh-speaking women led to the adaptation of the resulting Kazakh ACSS to address potential linguistic difficulties. Some ethnolinguistic adaptations were required for the "*Dynamics*" domain (Part B), after which a pilot clinical validation was performed to assess the applicability of the translated ACSS for diagnosing AC in the Kazakh-speaking female population (Figures 1A, B).

Study design, ethical considerations and study participants

The study protocol was approved by the Central Bioethics Commission of the Republic of Kazakhstan (Protocol No. 23 dated June 29, 2023). The study was conducted at three selected medical centers in the Republic of Kazakhstan specializing in the management of UTIs.
Native Kazakh-speaking women aged 18 years and older who presented for urological consultation with a symptomatic episode of cystitis between September 2, 2023 and May 7, 2024 were recruited for the study.
Before enrollment, potential respondents received full information about the research project, including an information booklet and an informed consent form. They were also verbally informed by the researcher.
Women with diabetes mellitus, those receiving pharmacological or herbal treatment for UTIs, and those receiving antimicrobial agents for any condition were excluded from the study.
The sample size was determined according to the approach proposed by *Tsang et al.*, which recommends a 5:1 respondent-to-item ratio for questionnaire-based studies (22). Based on this approach, a total sample size of 100 respondents (67 patients and 33 controls) was considered sufficient.
All included women received printed copies of the ACSS and completed the questionnaire independently. The data were then entered into an electronic database using custom-designed registration software.
All participants underwent standard clinical investigations in accordance with the clinical guidelines (23).
According to the study protocol, the study population comprised two groups. The patient group included women with AC confirmed at admission by the results of clinical and laboratory investigations, including pyuria and bacteriuria. The control group consisted of consecutively recruited women attending the participating centers in whom AC was not suspected.
Group assignment was based on a blinded adjudication procedure. First, one urologist assessed participants using medical history and clinical and laboratory investigation results, blinded to ACSS results. Next, a second urologist assessed participants based only on ACSS data and applied a prespecified cut-off of 6 for the "*Typical*" domain summary score, as established in prior validation studies (5). Then, a third urologist reviewed both assessments. When assessments were concordant, participants were assigned to the corresponding study group.

Statistical analysis

All statistical analyses were performed using IBM SPSS Statistics for Windows, version 22.0 (*IBM Corp., Armonk, NY, USA*) (24).
Normality of the data distribution was assessed both numerically using the Shapiro-Wilk test and visually using Q-Q plots.
Descriptive statistics were used to summarize the basic sociodemographic characteristics of the respondents.
Continuous variables are reported as means with *standard deviations* (SD) or medians with *interquartile ranges* (IQR), as appropriate. Categorical variables are reported as frequencies and percentages.
The internal consistency of the Kazakh version of the ACSS was evaluated using Cronbach's alpha and split-half reliability coefficients (25).
Comparative analyses were performed using parametric and nonparametric tests, including the Student's t-test, the chi-square test, the Fisher's exact test, and the Wilcoxon-Mann-Whitney test, where appropriate. The choice between parametric and nonparametric tests was based on data distribution, measurement level, and variable type.
The diagnostic performance of the ACSS was assessed using sensitivity, specificity, *positive and negative predictive values* (PPV, NPV), positive and negative likelihood ratios (LR+, LR–), the diagnostic *odds ratio* (DOR), and the Youden index. *Receiver operating characteristic* (ROC) analysis was performed to assess overall diagnostic performance and to identify the optimal balance between sensitivity and specificity. The area under the ROC curve

Figure 1A.
The Kazakh version of the ACSS ("diagnostic part A").

ACSS сауалнамасы

Алғашқы қабылдау (диагностикалық нысан) – А бөлімі

Уақыты: _ : ____ Бағалау күні: / / (кк/аа/жжжж)

Соңғы 24 сағат ішінде сізде келесі симптомдарды байқасаңыз, оларды көрсетіңіз және олардың қаншалықты ауыр болғанын белгілеңіз: ***(Әрбір симптом үшін тек бір жауапты ✓белгілеңіз)***			**0**	**1**	**2**	**3**
Әдеттегі	**1**	Аз мөлшерде және жиі зәр шығару *(дәретханаға жиі бару)*	☐ Жоқ *күніне 4 рет немесе одан аз*	☐ Иә, аздап *күніне 5-6 рет*	☐ Иә, орташа *күніне 7-8 рет*	☐ Иә, қатты *күніне 9-10 рет немесе одан да көп*
	2	Шұғыл зәр шығару *(қатты және еріксіз зәр шығару қажеттігі)*	☐ Жоқ	☐ Иә, аздап	☐ Иә, орташа	☐ Иә, қатты
	3	Зәр шығару кезінде ауырсынуды немесе ашығанды сезіну	☐ Жоқ	☐ Иә, аздап	☐ Иә, орташа	☐ Иә, қатты
	4	Зәр шығарғаннан кейін қуықтың толық босатылмағанын сезіну	☐ Жоқ	☐ Иә, аздап	☐ Иә, орташа	☐ Иә, қатты
	5	Іштің төменгі жағында *(қасаға үстіндегі аймақта)* ауырсыну немесе жайсыздық сезіну	☐ Жоқ	☐ Иә, аздап	☐ Иә, орташа	☐ Иә, қатты
	6	Зәрде көзге көрінетін қанның болуы	☐ Жоқ	☐ Иә, аздап	☐ Иә, орташа	☐ Иә, қатты
					«Әдеттегі» баллдардың қосындысы =	**балл**
Ерекше	**7**	Белдің *(арқаның төменгі жағы)* ауырсынуы (*дененің бір жағында ғана болуы мүмкін*)	☐ Жоқ	☐ Иә, аздап	☐ Иә, орташа	☐ Иә, қатты
	8	Жыныстық жолдардан бөлініс *(әсіресе таңертең)*	☐ Жоқ	☐ Иә, аздап	☐ Иә, орташа	☐ Иә, қатты
	9	Несеп жолынан бөлініс *(зәр шығарусыз)*	☐ Жоқ	☐ Иә, аздап	☐ Иә, орташа	☐ Иә, қатты
	10	Жоғары дене температурасы *(қалтырау/қызу)*	☐ Жоқ	☐ Иә, аздап	☐ Иә, орташа	☐ Иә, қатты
		(Өлшеген болсаңыз, ✓көрсетіңіз)	≤37,5 °C	37,6-37,9 °C	38,0-38,9 °C	≥39,0 °C
					«Ерекше» баллдардың қосындысы =	**балл**
Өмір сапасы	**11**	**Соңғы 24 сағат ішінде жоғарыда аталған симптомдардың сізді қаншалықты мазалағанына жалпы баға беріңіз** ***(тек бір жауапты ✓белгілеңіз)***				
		☐ 0 Ешқандай жайсыздық сезінбедім *(Ешқандай симптом жоқ. Әдеттегідей жақсы сезіндім)*				
		☐ 1 Аздап жайсыздық сезімі бар *(Әдеттегіден сәл нашар)*				
		☐ 2 Орташа жайсыздық сезімі бар *(Әдеттегіден едәуір нашар)*				
		☐ 3 Қатты жайсыздық сезімі бар *(Өте нашар)*				
	12	**Соңғы 24 сағат ішінде жоғарыда аталған симптомдардың әдеттегі жұмысыңызға / күнделікті әрекеттеріңізге әсер етуін дәл сипаттайтын нөмірді таңдаңыз** ***(тек бір жауапты ✓белгілеңіз)***				
		☐ 0 Мүлдем әсер етпеді *(Күнделікті әрекеттерді қалыпты орындау)*				
		☐ 1 Аздап әсер етті *(Күнделікті әрекеттерді кейбір жайсыздықпен орындауға қабілетті)*				
		☐ 2 Орташа әсер етті *(Күнделікті әрекеттерді орындау үшін айтарлықтай күш жұмсау қажет)*				
		☐ 3 Қатты әсер етті *(Күнделікті әрекеттерді орындау мүмкін емес)*				
	13	**Жоғарыда аталған симптомдардың соңғы 24 сағат ішінде сіздің әлеуметтік белсенділігіңізге қаншалықты әсер еткенін көрсетіңіз** ***(тек бір жауапты ✓белгілеңіз)***				
		☐ 0 Мүлдем әсер етпеді *(Қалыпты әлеуметтік белсенділікпен айналысуға қабілетті)*				
		☐ 1 Аздап әсер етті *(Кейбір әлеуметтік белсенділікпен айналысуға қабілетсіз)*				
		☐ 2 Орташа әсер етті *(Аздаған әлеуметтік белсенділікпен айналысуға қабілетті)*				
		☐ 3 Қатты әсер етті *(Кез келген әлеуметтік белсенділікпен айналысуға қабілетсіз – симптомдар мені үйімде «қамалып отыруға» мәжбүр етеді)*				
					«Өмір сапасы» баллдарының қосындысы =	**балл**
Қосымша	**14**	**Бүгін сізде төмендегілердің бар болуын көрсетіңіз:**				
		Менструация *(әйелдердегі етеккір)*?			☐ Жоқ	☐ Иә
		Етеккір алдындағы симптомдар?			☐ Жоқ	☐ Иә
		Менопауза симптомдары?			☐ Жоқ	☐ Иә
		Сіз жүктісіз бе?			☐ Жоқ	☐ Иә
		Сізде қант диабеті *(сусамыр)* бар ма?			☐ Жоқ	☐ Иә

АЯҚТАУ **Толтырылған сауалнаманы дәрігерге қайтаруды ұмытпаңыз**

Ынтымақтастық үшін рақмет

Figure 1B.
The Kazakh version of the ACSS (follow-up part B).

ACSS сауалнамасы

Бақылау қабылдауы (бақылау нысаны) – Б бөлімі

Уақыты: ___ : ____ Бағалау күні: / / (кк/аа/жжжж)

Осы сауалнаманың бірінші бөлігін толтырғаннан бері симптомдарыңызда қандай да бір өзгерістер болғанын байқасаңыз, оларды көрсетіңіз *(әрбір симптом үшін тек бір* жауапты ✓*белгілеңіз)*						
Динамика	☐ 0 Қазір мен өзімді бұрынғыдай жақсы сезінемін *(Барлық симптомдар жойылды)* ☐ 1 Қазір жағдайым біршама жақсарды *(Симптомдардың көпшілігі жойылды)* ☐ 2 Қазір мен өзімді сәл ғана жақсырақ сезінемін *(Симптомдардың көпшілігі әлі де бар)* ☐ 3 Ешқандай өзгеріс жоқ, қазір мен өзімді алдындағыдай сезінемін *(Симптомдарда ешқандай өзгеріс жоқ)* ☐ 4 Қазір өзімді нашар сезінемін *(Жағдайым нашарлады)*					
Соңғы 24 сағат ішінде сізде келесі симптомдарды байқасаңыз, оларды көрсетіңіз және олардың қаншалықты ауыр болғанын белгілеңіз: *(Әрбір симптом үшін тек бір* жауапты ✓*белгілеңіз)*						
			0	**1**	**2**	**3**
Әдеттегі	**1**	Аз мөлшерде және жиі зәр шығару *(дәретханаға жиі бару)*	☐ Жоқ *күніне 4 рет немесе одан аз*	☐ Иә, аздап *күніне 5-6 рет*	○ Иә, орташа *күніне 7-8 рет*	☐ Иә, қатты *күніне 9-10 рет немесе одан да көп*
	2	Шұғыл зәр шығару *(қатты және еріксіз зәр шығару қажеттігі)*	☐ Жоқ	☐ Иә, аздап	○ Иә, орташа	☐ Иә, қатты
	3	Зәр шығару кезінде ауырсынуды немесе ашығанды сезіну	☐ Жоқ	☐ Иә, аздап	○ Иә, орташа	☐ Иә, қатты
	4	Зәр шығарғаннан кейін қуықтың толық босатылмағанын сезіну	☐ Жоқ	☐ Иә, аздап	○ Иә, орташа	☐ Иә, қатты
	5	Іштің төменгі жағында *(қасаға үстіндегі аймақта)* ауырсыну немесе жайсыздық сезіну	☐ Жоқ	☐ Иә, аздап	○ Иә, орташа	☐ Иә, қатты
	6	Зәрде көзге көрінетін қанның болуы	☐ Жоқ	☐ Иә, аздап	○ Иә, орташа	☐ Иә, қатты
		«Әдеттегі» баллдардың қосындысы =				**балл**
Ерекше	**7**	Белдің *(арқаның төменгі жағы)* ауырсынуы (*дененің бір жағында ғана болуы мүмкін*)	☐ Жоқ	☐ Иә, аздап	○ Иә, орташа	☐ Иә, қатты
	8	Жыныстық жолдардан бөлініс *(әсіресе таңертең)*	☐ Жоқ	☐ Иә, аздап	○ Иә, орташа	☐ Иә, қатты
	9	Несеп жолынан бөлініс *(зәр шығарусыз)*	☐ Жоқ	☐ Иә, аздап	○ Иә, орташа	☐ Иә, қатты
	10	Жоғары дене температурасы *(қалтырау/қызу)* *(Өлшеген болсаңыз, ✓көрсетіңіз)*	☐ Жоқ ≤37,5 °C	☐ Иә, аздап 37,6-37,9 °C	○ Иә, орташа 38,0-38,9 °C	☐ Иә, қатты ≥39,0 °C
		«Ерекше» баллдардың қосындысы =				**балл**
Өмір сапасы	**11**	**Соңғы 24 сағат ішінде жоғарыда аталған симптомдардың сізді қаншалықты мазалағанына жалпы баға беріңіз *(тек бір* жауапты ✓*белгілеңіз)*** ☐ 0 Ешқандай жайсыздық сезінбедім *(Ешқандай симптом жоқ. Әдеттегідей жақсы сезіндім)* ☐ 1 Аздап жайсыздық сезімі бар *(Әдеттегіден сәл нашар)* ☐ 2 Орташа жайсыздық сезімі бар *(Әдеттегіден едәуір нашар)* ☐ 3 Қатты жайсыздық сезімі бар *(Өте нашар)*				
	12	**Соңғы 24 сағат ішінде жоғарыда аталған симптомдардың әдеттегі жұмысыңызға / күнделікті әрекеттеріңізге әсер етуін дәл сипаттайтын нөмірді таңдаңыз *(тек бір* жауапты ✓*белгілеңіз)*** ☐ 0 Мүлдем әсер етпеді *(Күнделікті әрекеттерді қалыпты орындау)* ☐ 1 Аздап әсер етті *(Күнделікті әрекеттерді кейбір жайсыздықпен орындауға қабілетті)* ☐ 2 Орташа әсер етті *(Күнделікті әрекеттерді орындау үшін айтарлықтай күш жұмсау қажет)* ☐ 3 Қатты әсер етті *(Күнделікті әрекеттерді орындау мүмкін емес)*				
	13	**Жоғарыда аталған симптомдардың соңғы 24 сағат ішінде сіздің әлеуметтік белсенділігіңізге қаншалықты әсер еткенін көрсетіңіз *(тек бір* жауапты ✓*белгілеңіз)*** ☐ 0 Мүлдем әсер етпеді *(Қалыпты әлеуметтік белсенділікпен айналысуға қабілетті)* ☐ 1 Аздап әсер етті *(Кейбір әлеуметтік белсенділікпен айналысуға қабілетсіз)* ☐ 2 Орташа әсер етті *(Аздаған әлеуметтік белсенділікпен айналысуға қабілетті)* ☐ 3 Қатты әсер етті *(Кез келген әлеуметтік белсенділікпен айналысуға қабілетсіз – симптомдар мені үйімде «қамалып отыруға» мәжбүр етеді)*				
		«Өмір сапасы» баллдарының қосындысы =				**балл**
Қосымша	**14**	**Бүгін сізде төмендегілердің бар болуын көрсетіңіз:**				
		Менструация *(әйелдердегі етеккір)*?			☐ Жоқ	☐ Иә
		Етеккір алдындағы симптомдар?			☐ Жоқ	☐ Иә
		Менопауза симптомдары?			☐ Жоқ	☐ Иә
		Сіз жүктісіз бе?			☐ Жоқ	☐ Иә
		Сізде қант диабеті *(сусамыр) бар ма?*			☐ Жоқ	☐ Иә

АЯҚТАУ **Толтырылған сауалнаманы дәрігерге қайтаруды ұмытпаңыз**

Ынтымақтастық үшін рақмет

Parameters	Patients (n = 67)	Controls (n = 33)	Total (n = 100)	P-value
Age in years, mean (SD)	39.24 (13.66)	44.94 (17.99)	41.12 (15.37)	0.249 *
Origin				
Central Asia, n (%)	23 (34.3)	10 (30.3)	33 (33.0)	0.820 †
Prefer not to answer, n (%)	44 (65.7)	23 (69.7)	67 (67.0)	
Ethnic group				
Kazakh, n (%)	64 (95.5)	31 (93.9)	95 (95.0)	0.671 ‡
Turk, n (%)	1 (1.5)	0 (0.0)	1 (1.0)	
Tatar, n (%)	1 (1.5)	0 (0.0)	1 (1.0)	
Uzbek, n (%)	1 (1.5)	2 (6.1)	3 (3.0)	
Level of education				
Tertiary education (university degree), n (%)	52 (77.6)	21 (63.6)	73 (73.0)	0.234 ‡
Post-secondary education (college or technical degree), n (%)	12 (17.9)	11 (33.3)	23 (23.0)	
General secondary education (school diploma), n (%)	3 (4.5)	1 (3.0)	4 (4.0)	

*Note: * Student's t-test; † Chi-square test; ‡ Fisher's exact test.*

Table 1.
Baseline characteristics of the study participants.

(AUC) and its 95% *confidence interval* (CI) were calculated. A two-sided P value < 0.05 was considered statistically significant.
Effect size coefficients, including Cohen's d, Hedges' g, and effect size r, were assessed to provide a post hoc indication of whether the achieved sample size was sufficient and to support the interpretation of the observed between-group differences.

Results

Study participants

The total study population included 100 native Kazakh-speaking women, of whom 67 were classified as Patients and 33 as Controls.
Demographic characteristics of the participants are presented in Table 1. No statistically significant differences were observed between patients and controls with regard to age, ethnic origin, ethnic group, first language, or level of education (Table 1).

Reliability of the Kazakh version of the ACSS

Cronbach's α for the entire ACSS was 0.79 (95% CI: 0.72-0.85). Internal consistency coefficients were 0.75 and 0.64 for the first half and the second half, respectively. The inter-half correlation was 0.50, with Spearman-Brown and Guttman split-half coefficients of 0.66 and 0.58, respectively.
For the "*Typical*" domain, Cronbach's α was 0.86 (95% CI: 0.81-0.90). The split-half correlation between the two halves was 0.65. Internal consistency was 0.87 for the first half and 0.69 for the second half. The corresponding Spearman-Brown and Guttman split-half coefficients were 0.79 and 0.77, respectively, confirming the stability and representativeness of this domain.
Cronbach's α for the "*Differential*" domain was 0.59 (95% CI: 0.44-0.71). The split-half correlation between the two halves was 0.28, whereas the corresponding Spearman-Brown and Guttman split-half coefficients were 0.70 and 0.67, respectively. Overall, the "*Differential*" domain had the lowest reliability among the ACSS domains.
By contrast, the "*QoL*" domain demonstrated the highest reliability, with a Cronbach's α of 0.91 (95% CI: 0.88-0.94), an average inter-item correlation of 0.79, and corresponding Spearman-Brown and Guttman coefficients of 0.88 and 0.78, respectively (Table 2).

Table 2.
Reliability metrics of the target and source versions of the ACSS.

Parameter	Target version (Kazakh)	Source version (Uzbek)
Full-scale reliability (entire ACSS)		
Cronbach's alpha (95% CI)	0.79 (0.72-0.85)	0.87 (0.85-0.90)
Split-half correlation between halves	0.50	0.68
Internal consistency of the first half	0.75	0.85
Internal consistency of the second half	0.64	0.73
Spearman–Brown coefficient	0.66	0.81
Guttman split half coefficient	0.58	0.75
Reliability of the "Typical" domain		
Cronbach's alpha (95% CI)	0.86 (0.81-0.90)	0.87 (0.85-0.89)
Split-half correlation between halves	0.65	0.76
Internal consistency of the first half	0.87	0.83
Internal consistency of the second half	0.69	0.73
Spearman–Brown coefficient	0.79	0.87
Guttman split half coefficient	0.77	0.85
Reliability of the "Differential" domain		
Cronbach's alpha (95% CI)	0.59 (0.44-0.71)	0.56 (0.46-0.64)
Split-half correlation between halves	0.28	0.30
Internal consistency of the first half	0.44	0.89
Internal consistency of the second half	0.54	0.30
Spearman–Brown coefficient	0.70	0.47
Guttman split half coefficient	0.67	0.45
Reliability of the "QoL" domain		
Cronbach's alpha (95% CI)	0.91 (0.88-0.94)	0.89 (0.87-0.91)
Average inter-item correlation	0.79	0.78
Spearman–Brown coefficient	0.88	0.89
Guttman split half coefficient	0.78	0.80

Table 3.
Median (IQR) scores of ACSS items, domains, and total scale in patients and controls.

Parameter	Patients, median (IQR)	Controls, median (IQR)	P-value *
"Typical" domain			
Frequency	1.00 (1.00-2.00)	0.00 (0.00-0.00)	< 0.001
Urgency	1.00 (1.00-2.00)	0.00 (0.00-0.00)	< 0.001
Painful urination	1.00 (1.00-3.00)	0.00 (0.00-0.00)	< 0.001
Incomplete bladder emptying	1.00 (1.00-1.00)	0.00 (0.00-0.00)	< 0.001
Suprapubic pain	1.00 (1.00-2.00)	0.00 (0.00-0.00)	< 0.001
Visible blood in urine	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.076
Domain summary score	5.00 (4.50-8.00)	0.00 (0.00-0.00)	< 0.001
"Differential" domain			
Flank pain	1.00 (1.00-2.00)	0.00 (0.00-0.00)	< 0.001
Vaginal discharge	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.053
Urethral discharge	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.073
Feeling of chill/fever	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.024
Domain summary score	0.00 (0.00-1.00)	2.00 (1.00-2.00)	< 0.001
"QoL" domain			
General discomfort,	1.00 (1.00-2.00)	0.00 (0.00-1.00)	< 0.001
Impairment of everyday activity	1.00 (1.00-1.50)	1.00 (0.00-1.00)	< 0.001
Impairment of social activity	1.00 (1.00-2.00)	1.00 (0.00-1.00)	0.002
Domain summary score	3.00 (3.00-4.50)	3.00 (0.00-3.00)	< 0.001
Entire ACSS, summary score**	10.00 (8.00-12.50)	5.00 (2.00-7.00)	< 0.001

*Note: * Wilcoxon-Mann-Whitney test; ** Excepting the "Additional" domain.*

Between-group comparison and diagnostic performance of the ACSS

The median summary score of the "Typical" domain was significantly higher in Patients compared to Controls [5.00 (IQR 4.50-8.00) *vs* 0.00 (IQR 0.00-0.00); $p < 0.001$]. Significant between-group differences were observed for all individual items of the "*Typical*" domain ($p < 0.001$) except visible blood in urine ($p = 0.076$).

By contrast, the median summary score of the "*Differential*" domain was significantly higher in Controls than in Patients [2.00 (IQR 1.00-2.00) *vs.* 0.00 (IQR 0.00-1.00); $p < 0.001$]. Significant differences were observed for flank pain ($p < 0.001$) and feeling of chill/fever ($p = 0.024$), whereas vaginal discharge ($p = 0.053$) and urethral discharge ($p = 0.073$) did not differ significantly between the groups (Table 3).

The median overall ACSS summary score was significantly higher in Patients than in Controls [10.00 (IQR 8.00-12.50) *vs.* 5.00 (IQR 2.00-7.00); $p < 0.001$] (Table 3).

Additional effect size estimates are presented in Supplementary Table S1.

At a cut-off summary score of 6 for the "*Typical*" domain, the ACSS showed sensitivity of 0.85 and specificity of 0.90 (Table 4). The corresponding PPV and NPV were 0.80 and 0.92, whereas LR+ and LR– were 8.12 and 0.17, respectively. The DOR was 48, and the Youden index was 0.74.

ROC-curve analysis of the "*Typical*" domain summary score yielded an AUC of 0.86 (95% CI: 0.79-0.94), indicating good discriminative performance (Table 4).

Parameter	Fisher's *F*	Cohen's *d*	Effect size *r* *	Hedge's *g*	Diagnostic power
"Typical" domain					
Frequency	71.96	1.92	0.69	1.91	1.00
Urgency	37.05	1.23	0.52	1.22	1.00
Painful urination	98.66	2.06	0.72	2.05	1.00
Incomplete bladder emptying	36.61	1.30	0.55	1.29	1.00
Suprapubic pain	43.27	1.47	0.59	1.45	1.00
Visible blood in urine	2.94	0.39	0.19	0.38	0.44
Domain summary score	74.57	2.15	0.73	2.13	1.00
"Differential" domain					
Flank pain	34.24	1.47	0.59	1.45	1.00
Vaginal discharge	3.67	0.41	0.20	0.41	0.48
Urethral discharge	2.67	0.38	0.19	0.38	0.43
Feeling of chill/fever	5.45	0.43	0.21	0.43	0.52
Domain summary score	26.70	0.63	0.30	0.62	0.83
"QoL" domain					
General discomfort	33.03	0.89	0.41	0.88	0.99
Impairment of everyday activity	24.49	0.79	0.37	0.78	0.96
Impairment of social activity	19.17	0.74	0.35	0.74	0.93
Domain summary score	41.52	0.88	0.40	0.87	0.98
Entire ACSS, summary score	45.96	1.49	0.60	1.48	1.00

*Note: * Pearson's effect size correlation coefficient.*

Supplementary Table 1.
Effect sizes and additional statistical metrics for ACSS items, domains, and the entire scale.

Table 4.
Diagnostic performance of the Kazakh ACSS at the cut-off summary score of 6 for the "Typical" domain.

Parameter	Value
Sensitivity	0.85
Specificity	0.90
Diagnostic odds ratio (DOR)	48.00
Youden index	0.74
Positive predictive value (PPV)	0.80
Negative predictive value (NPV)	0.92
Positive likelihood ratio (LR+)	8.12
Negative likelihood ratio (LR-)	0.17
Area under the ROC curve (95% CI)	0.86 (0.79-0.94)

Discussion

The results in the context of previous studies and clinical applicability

With increasing antibiotic resistance, there is an urgent need for a simple and reliable tool that could improve the accuracy of diagnosis to prescribe antibiotics.

International guidelines for the treatment of urological infections emphasize the importance of empirical treatment based on the local epidemiology of bacterial resistance and programs for the rational use of antibiotics. However, the first step remains the correct diagnosis of AC. The EAU guidelines recommend carefully evaluating all symptoms and risk factors in patients (26), but a validated and self-filled questionnaire for clinical diagnosis in Kazakh has not yet been designed. Such a tool can also be used for self-diagnosis and self-assessment of the results reported by patients, which will allow comparing the effectiveness of various treatment approaches, including both antibacterial and non-antibiotic therapy.

There is a lack of literature regarding the impact of UTIs on patients' quality of life. *Patient-reported outcome measures* (PROMs) are becoming increasingly relevant in medicine, and the body of research in this area is growing rapidly. PROMs are typically questionnaires completed by patients, providing information from their perspective without physician interpretation. This approach yields valuable insights into symptoms, *health-related quality of life* (HRQoL), and patients' functional status. Piontek et al. described the ACSS as having adequate content validity. Along with the UTI-SIQ-8, it was one of two PROMs recommended for use in cases of acute uncomplicated *urinary tract infections* (UTIs) in women (27).

Moreover, in a systematic review by *Harrison NL et al.*, the ACSS is characterized as a brief and easy-to-use tool that has undergone multiple validations in several languages and is specific to UTIs (20).

The ACSS was originally developed in Uzbek and subsequently translated into Russian. In the combined validation of these source versions, a cutoff value by the summary score of 6 for the "*Typical*" domain yielded a sensitivity of 0.94 and a specificity of 0.90 (5). This threshold was later confirmed in multiple language versions, including German, Hungarian, Italian, American English, Korean, Polish, Spanish, and Turkish, with reported sensitivity ranging from 0.88 to 0.99 and specificity from 0.79 to 0.98 underscoring the robustness and cross-linguistic stability of the ACSS across diverse clinical settings (6, 8-10, 13, 15-17).

Declarations

Ethical approval and consent for participate: *The study was conducted in accordance with the protocol approved by the Central Bioethics Commission of the Republic of Kazakhstan (Protocol No. 23 dated June 29, 2023).*

Availability of data and material: *All data generated or analyzed during this study are available upon request.*

Competing interests: *Kurt G. Naber, Florian M.E. Wagenlehner and Jakhongir Alidjanov are authors and copyright holders of the ACSS.*
Jakhongir Alidjanov is currently an employee of Bionorica SE (Neumarkt in der Oberpfalz, Germany). All findings, interpretations, and conclusions are solely those of the authors and do not represent the official policy of Bionorica SE.

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Patents & Copyright information: *The ACSS is protected by the Certificate of Deposit of Intellectual Property in the Fundamental Library of the Academy of Sciences of the Republic of Uzbekistan, Tashkent (Registration No. 2463; 26 August 2015), and by the Certificate of the International Online Copyright Office, European Depository, Berlin, Germany (No. EU-01-000764; 21 October 2015). Any use of the ACSS without prior permission from the copyright holders is not permitted. For inquiries regarding permission for use, please refer to the official website: www.acss.world.*
The Kazakh version of the ACSS will soon be available on www.acss.world as a higher-resolution PDF.

Authors' contributions: *Ulanbek Zhanbyrbekuly – conceptualization, supervision, retrospective data organization, manuscript review. Anuar Amanov – critical revision of the draft, approval of the final version. Yerzhan Sharapatov – literature search, data collection, statistical analysis, drafting of the manuscript. Yakub Khakhazov – data processing, drafting of the manuscript, descriptive analysis. Chingis Baimenov – supervision, formal analysis. Alizhan Kozhamzharov – supervision, formal analysis. Mirzaakhmet Zhanadilov – supervision, formal analysis. Kurt G. Naber – supervision, manuscript editing, critical revision of the manuscript, approval of the final version. Florian M.E. Wagenlehner – supervision, approval of the final version. Jakhongir Alidjanov – methodology, supervision, manuscript editing, critical revision of the manuscript, approval of the final version.*

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In this context, the findings of our study support the cross-linguistic reproducibility. Although diagnostic parameters obtained for the Kazakh version were slightly lower than those reported in some earlier validation studies with larger cohorts, they remained within an acceptable and clinically meaningful range. This confirms the ability of the Kazakh ACSS to reliably differentiate acute cystitis from non-acute cystitis cases. The level of diagnostic accuracy observed within our study is particularly relevant, given the ongoing need for standardized, symptom-based assessment tools for women with suspected AC.

Although lower urinary tract symptoms are common in acute cystitis, they are not disease-specific and may also occur in other urogenital disorders (28, 29). Therefore, not only the presence of symptoms, but also their severity and pattern should be taken into account. In this respect, an important strength of the ACSS is that it assesses symptom intensity, quality-of-life impairment, and differential features that may help distinguish cystitis from other urogenital conditions.

Limitations of the study

One of the limitations of this study is that in the Differential, the control group showed higher median values (2.00, IQR 1.00-2.00) compared to the patient group (0.00, IQR 0.00-1.00), and the difference between the groups turned out to be statistically significant ($p < 0.001$). This may indicate potential biases in the interpretation of the results.

Another limitation may arise due to the subjectivity of the responses to self-completed questionnaires, as individual interpretation of the questions may vary. To minimize this possible limitation, the Kazakh version of ACSS was translated from Uzbek by two independent specialists in accordance with international standards and finally approved after a thorough cognitive assessment procedure, during which 10 women were interviewed. They were all native speakers of the Kazakh language and had different levels of education.

The third limitation is related to the difficulty of clinically differentiating AC from other urological diseases such as overactive bladder, urolithiasis, interstitial cystitis, or obstructive cystocele, which have similar symptoms. However, the main clinical differences, in addition to the positive result of urine culture, are the acute onset and pronounced typical symptoms of AC compared with other urological pathologies.

Conclusions

The Kazakh version of the ACSS has demonstrated its reliability in diagnosing AC in women due to statistically significant correlations between patients and the control group.

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