Cogitare Enfermagem

ORIGINAL ARTICLE

CONDUCTS THAT MAY INTERFERE IN THE PRE-ANALYTICAL PHASE OF THE URINE SUMMARY TEST

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ABSTRACT

Objective: to identify the pre-analytical conducts that can influence the results of the urine summary test.

Method: this is an exploratory, descriptive, cross-sectional study, of quantitative nature, conducted with 246 patients from a public reference laboratory in the municipality of João Pessoa, Paraíba, during the months of June and July 2019. Data analysis was performed by descriptive and inferential statistics, with Chi-square Test and Spearman Correlation, cast after Kolmogorov-Smirnov test.

Results: regarding knowledge about the exam, 138 (56.1%) of the participants said they had it, but 174 (70.7%) reported not having been instructed before the exam. The correlation showed that the greater the knowledge, the more appropriate were the pre-analytical procedures.

Conclusion: a low level of knowledge about the procedure was observed, contributing to inadequate pre-analytical conducts. The importance of offering the client guidance on the collection of the exam is highlighted.

DESCRIPTORS: Nursing; Clinical Laboratory Techniques; Urine Specimen Collection; Knowledge; Diagnostic Tests, Routine.

CONDUCTAS QUE PUEDEN INTERFERIR EN LA FASE PREANALÍTICA DE LA PRUEBA SUMARIA DE ORINA

RESUMEN:

Objetivo: identificar las condiciones preanalíticas que pueden influir en los resultados de la prueba sumaria de orina. Método: se trata de un estudio exploratorio, descriptivo, transversal, de carácter cuantitativo, realizado con 246 pacientes de un laboratorio público de referencia del municipio de João Pessoa, Paraíba, durante los meses de junio y julio de 2019. El análisis de los datos se realizó mediante estadísticas descriptivas e inferenciales, con la prueba de Chi-cuadrado y la correlación de Spearman, que figuran después de la prueba de Kolmogorov-Smirnov. Resultados: en cuanto a los conocimientos sobre el examen, 138 (56,1%) de los participantes afirmaron tenerlos, pero 174 (70,7%) declararon no haber recibido orientación antes del examen. La correlación demostró que cuanto mayor era el conocimiento, más adecuados eran los procedimientos preanalíticos. Conclusión: se observó un bajo nivel de conocimiento sobre el procedimiento, lo que contribuyó a que las conclusiones preanalíticas fueran inadecuadas. Destaca la importancia de ofrecer al cliente orientaciones sobre la coleta de la prueba. DESCRIPTORES: Enfermería; Técnicas de Laboratorio Clínico; Toma de Muestras de Orina; Conocimiento; Pruebas Diagnósticas de Rutina.

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INTRODUCTION

Currently, the most important objective of diagnostic medicine is to ensure efficient and safe care to health professionals and patients, providing results with absolute accuracy, whether laboratory or imaging, with reliable results for subsequent decision making by physicians regarding the clinical management of their patients. Failures in this analysis are significant threats to patient safety, causing delays and even lack of diagnosis [1].

To better understand the sources of errors in clinical laboratories, one must first know and analyze the phases and processes that comprise the diagnostic techniques. Theoretically, the laboratory phases are classically divided into three: pre-analytical, analytical, and post-analytical. The pre-analytical phase is related to the request for the analysis, going through the relevant orientation of the patients, collection, identification, storage, transport, and receipt of the biological samples. It is estimated that problems in this stage are responsible for about 70% of the errors that occur in laboratories [2].

Several biological materials can be analyzed, such as blood, urine, feces, cerebrospinal fluid, vaginal, anal, oropharyngeal, ocular and other body regions exudates, among other types of samples [3]. The urine summary test is composed of a set of characteristics, the physical-chemical ones being volume, appearance, color, smell, density and pH, proteins, hemoglobins, glucose, ketones, bilirubin, urobilinogen, nitrite, and leukocytes. Among the elements present in the urinary sediment, we have mucus filaments, epithelial cells, leukocytes, RBCs, cylinder, crystals, fermentation bacteria, and other elements. The joint analysis of all these elements is important for the clinical and therapeutic definition of the patient [4].

The most commonly used types of samples for urine summary analysis are: random, which is performed at any time of the day, as long as the interval of two hours after urination is respected; the first morning urine, considered the ideal sample for analysis because it is more concentrated and presents more reliable results; and, finally, the second morning urine, which must be collected between two and four hours after the first urination, during which time the patient should remain fasting [4-5].

The analysis of the urine summary is of great relevance to aid in the diagnosis and follow-up of different pathologies such as: kidney and urinary tract infections, metabolic diseases not related to the urinary system such as diabetes mellitus, thyroid or liver diseases, as well as routine clinical screening before hospital admission and before surgical procedures [5].

It is recognized that the main interferences in urinary sediment analysis are contamination of the collection or lack of experience of the analyst, both by common optical microscopy and by automated methods. This shows how important the adequate collection of the material to be examined is [4].

It is noteworthy that the pre-analytical phase begins with the collection of material, performed by the patient, who should be informed of all the recommended conducts, whether at home or at the hospital. The error in this stage ranges from carelessness and lack of guidance to the patient, to the lack of understanding about good laboratory practices, as well as inefficient training. Proper management of these pre-analytical processes ensures the accuracy of the results of the analytical phase [2].

The present study is justified because certain behaviors can compromise the results of laboratory analysis and thus affect the treatment and clinical management established for the patient. False negative results can lead to irreparable damage to the client since therapeutic decisions are made based on the diagnosis. In view of this problem, the present article aimed to identify the pre-analytical procedures that can influence the results of the urine summary test.

METHOD

A descriptive, cross-sectional, quantitative study was conducted in a public reference laboratory in the municipality of João Pessoa-PB, Brazil. This service performs low, medium and high complexity exams, helping health professionals in the prevention and treatment of diseases.

The study population was composed of 710 patients who had undergone the urine summary exam in the year preceding the research. Subsequently, the sample was delimited considering the following formula: $n=Z2PQ/d2$, where n=minimum sample size; Z=reduced variable; P=probability of finding the studied phenomenon; Q=1-P; d=desired precision. We adopted p=50%, because it is a multidimensional evaluation, and a sampling error parameter of 5%. Through this calculation, we obtained a minimum sample size of 240 individuals.

Individuals of both genders were included in the study, aged 18 years or older, with verbal communication skills, and with a sample for urine summary. Patients who were going to undergo other types of urine tests, such as urine culture, were considered ineligible. Given the availability of participants and considering the eligibility criteria described here, the final sample was composed of 246 clients.

The data were collected from June to July 2019, with a structured instrument containing sociodemographic questions and the characteristics of the urine summary sample, such as the place and professional who requested the exam, as well as the characteristics of the collection, such as the environment in which the sample was collected, the time between collection and delivery to the laboratory, the collector used, whether they performed intimate hygiene before collection and whether they received guidance about the exam, as well as the level of knowledge about the topic.

Data analysis was performed using univariate descriptive statistics for all variables, including measures of frequency, position, and dispersion. To compare the main categorical variables, the chi-square test was used, according to the objectives proposed for the study. In order to verify the normality of the quantitative data, the Kolmogorov-Smirnov test was adopted. Then, Spearman's Correlation Coefficient was used, considering a 5% significance level. For this, the Statistical Package for the Social Sciences - SPSS version 22.0 computer system was used.

It is worth mentioning that the research followed the ethical principles established in Resolution No. 466/2012 of the National Health Council regarding the Guidelines and Norms Regulating Research Involving Human Beings. The research project was approved by the Research Ethics Committee of the João Pessoa University Center according to opinion 3.351.230.

RESULTS

A total of 246 patients were evaluated, of which 202 (82.1%) were female, while only 44 (17.9%) were male. Regarding marital status, it was found that 137 (55.7%) were married, 130 (52.8%) self-declared brown, and 108 (43.9%) had completed elementary school. Moreover, 140 (56.9%) of the interviewees reported following the Catholic precepts and most lived in the city of João Pessoa (n=243; 98.8%), as shown in Table 1.

Table 1 - Description of sociodemographic data. João Pessoa, PB, Brazil, 2019

Variable	Categories	n	%
Gender	Female	202	82,1
	Male	44	17,9
Marital status	Married	137	55,7
	Single	67	27,2
	Divorced	17	6,9
	Widow	24	9,8
	Did not answer	1	0,4
Race/Color	Brown	130	52,8
	White	98	39,8
	Black	17	6,9
	Indigenous	1	0,4
Schooling	Illiterate	24	9,8
	Elementary School	108	43,9
	High School	105	42,7
	Higher Education	9	3,7
Religion	Catholic	140	56,9
	Evangelical	83	33,7
	Spiritualist	3	1,2
	Others	5	2
	Ignored	15	6,1
Municipality of residence	João Pessoa	243	98,8
	Countryside	3	1,2

Source: Authors (2019)

Considering the data in Table 2, urine tests were mostly requested at Unidades Básicas de Saúde da Família (Basic Family Health Units), with 180 (73.2%) of the reported cases, in which the medical professional was the main responsible for the request (74.4%). Among the study participants, 235 (95.5%) said they collected the first sample, 232 (94.3%) of them at home. It was also identified that the time between the collection and delivery of the sample to the specialized laboratory lasted an average of two to three hours in 155 (63%) cases. Moreover, 243 (98.8%) patients reported using a sterile collector for sample storage, while 152 (61.8%) of the individuals confirmed having performed intimate hygiene before collection.

Table 2 - Description of the urine summary data. João Pessoa, PB, Brazil, 2019

Variable	Categories	n	%
Request Location	Basic Attention	180	73,2
	Clinic	38	15,4
	Hospital	28	11,4
Requesting professional	Physician	183	74,4
	Nurse	63	25,6
Sample Type	Random Sample	0	0,4
	First Sample	235	95,5
	Second Sample	10	4,1
Collected location	Residence	232	94,3
	Laboratory	14	5,7
Time of collection	Up to 2h	76	30,9
	2h-3h	155	63
	3h-4h	15	6,1
Used Collector	Sterile	243	98,8
	Non-sterile	3	1,2
Intimate hygiene	Yes	152	61,8
	No	94	38,2

Source: Authors (2019)

Considering the data in Table 3, 117 (52.4%) confirmed having collected urine from the second stream. Regarding knowledge about the exam, 138 (56.1%) of the participants affirmed having it, but 174 (70.7%) reported not having been oriented before the exam. Of those who received orientation, 33 (45.8%) were informed by the physician on how the urine sample should be collected.

Table 3 - Description of the urine summary data. João Pessoa, PB, Brazil, 2019 (continues)

Variable	Categories	n	%
Urine Jet Collected	First stream	117	47,6
	Second stream	129	52,4
Has knowledge about urine collection	Yes	138	56,1
	No	108	43,9
Previous Orientations	No	174	70,7
	Yes	72	29,3
Professional who provided orientation	Physician	33	45,8
	Nurse	28	38,9

| | Friends and family | 9 | 12,5 |
| | Others | 2 | 2,8 |

Source: Authors (2019)

Considering the data in Table 4, it was verified that, among women, most reported having knowledge about the urine test when compared to men. Schooling showed a statistically significant association with the level of knowledge (p<0.001): the years of schooling were related to the understanding about the theme in question. The variables time between collection and delivery of the sample to the laboratory (p=0.002), intimate hygiene (p<0.001) and urine stream collected (p<0.001) showed statistically significant association with the level of knowledge.

Table 4 - Association between patients' knowledge facing the urine test and sociodemographic characteristics and sample collection. João Pessoa, PB, Brazil, 2019 (continues)

Variable	Has knowledge about urine collection				p
	Yes		No		
	n	%	n	%	
Gender					p<0,001*
Female	125	61,9	77	38,1	
Male	13	29,5	31	70,5	
Total	138	56,1	108	43,9	
Schooling					p<0,001*
Illiterate	11	45,8	13	54,2	
Elementary School	48	44,4	60	55,6	
High School	74	70,5	31	29,5	
Higher Education	5	55,6	4	44,4	
Total	138	56,1	108	43,9	
Time of collection					p=0,002*
Up to 2 hours	49	64,5	27	35,5	
2h - 3 h	85	54,8	70	45,2	
3h - 4h	4	26,7	11	73,3	
Total	138	56,1	108	43,9	
Intimate hygiene					p<0,001*
Yes	116	76,3	36	23,7	
No	22	23,4	72	76,6	
Total	138	56,1	108	43,9	
Urine Jet Collected					p<0,001*
First	32	27,4	85	72,6	

Second	106	82,2	23	17,8
Total	138	56,1	108	43,9

* Chi-square
Source: Authors (2019)

The correlation between the mean number of correct pre-analytical procedures and the level of knowledge and previous guidance on the exam was statistically significant (p≤0.05), showing a directly proportional relationship, since as the pre-analytical procedures were correctly performed, it was possible to observe a higher proportion of knowledge on the subject, as shown in Table 5.

Table 5 - Correlation between the level of knowledge and guidance on the examination and correct pre-analytical conducts. João Pessoa, PB, Brazil, 2019

Correlation	Correct conduct	
	r	p*
Knowledge	0,546	p<0,001
Guidelines	0,384	p<0,001

* Spearman's Correlation Coefficient
Source: Authors (2019)

DISCUSSION

Among the existing phases in laboratory tests, it is recognized that the pre-analytical stage is responsible for about 46% to 70% of the errors. This phase starts with the request for the exam, patient preparation, sample collection, handling, transport, and storage, until the delivery of the collected material to the laboratory for analysis. Therefore, it is necessary that the healthcare professional has knowledge so that the patient is well instructed, with clear information about the collection of the urine summary test, since it frequently occurs outside the laboratory [6].

Regarding the sociodemographic data, there was a predominance of females, demonstrating a greater concern on the part of women in taking care of their own health, corroborated by a greater demand for health services when compared to men. Thus, the data observed in this research are consistent with a study conducted in the city of Ribeirão Preto-SP, which revealed that women seek health services 1.9 times more often than men[7].

It is recognized that women are the most susceptible to lower urinary tract infections, and several factors may influence the occurrence of this event. Among them, the size of women's urethra, which is shorter than men's, facilitating the entry of microorganisms, as well as their greater proximity to the vaginal vestibule and anus, which favors colonization by intestinal bacteria, stand out. Therefore, such factors may lead women to perform more urine tests [8].

It was verified in the present study that most of the interviewees had a low level of education. The level of education is directly associated with the understanding of instructions, especially regarding the conduct to be followed in the collection of tests. A research conducted in Primary Care in a city in the western region of Santa Catarina corroborates this finding, by stating that situations of social vulnerability, such as low education referred by users and the lack of understanding of the meaning of some words, and even the lack of knowledge about what a genital organ is, significantly hampered the understanding of how to perform the urine sample collection [9].

Furthermore, a statistically significant association was found between the level of education and the level of knowledge about the execution of the exam. It was evidenced that the lower the level of education, the less is known about the preparation for urine summary collection. Besides being an important component in determining habits, education influences the way of obtaining information. Individuals with high educational level have easy access to different means of information, such as books, internet and magazines, besides demonstrating greater ability to process and understand information [10].

Regarding the place of the request, it was verified the dominance of urine test requests from patients coming from Primary Health Care (PHC). The PHC is considered the main gateway to the Health Care Network and organizer of actions and care, since it plays a key role in solving problems of lower technological density, such as the request for laboratory tests, also acting in the promotion, prevention, health protection and performing actions that provide comprehensive care to users [11].

Regarding the requesting professional, there was a predominance of the physician, although nurses, especially in PHC, are also free to request this procedure, assigned as a routine established by the Ministry of Health, and in routines approved by health institutions. Thus, it is essential that nurses exercise with full capacity and responsibility the understanding about the request and interpretation of results, associating clinically with the signs and symptoms presented by patients [12].

It was observed the predominance of the first morning sample collection among the interviewees. The preference for the type of sample depends a lot on the exams to be performed, however it is frequently recommended the collection of the first urine of the day, in order to provide more convenience to the patient. Publications consider it the ideal sample for routine urine testing, for being more concentrated and allowing the detection of chemical substances and formed elements, which may be absent in random samples [4].

Regarding the place where the collection was performed, there was a predominance of the home environment. Despite the ease and simplicity of this test, it is important that the patient is well oriented as to the correct conducts so that the result is as reliable as possible and does not alter the diagnosis. Moreover, in this way, repetition due to uselessness of the sample is avoided, which generates unnecessary expenses for both the patient and the service [6].

Another important care is the time between collection and delivery of material to the laboratory. In the present study, it was found that users delivered the sample between two to three hours after urination. If the analysis of the material is not performed within two hours, the sample should be refrigerated in isothermal boxes. It is essential that all health professionals provide these guidelines concisely, thus preventing users from exceeding this deadline. It is noteworthy that the material that exceeds this time elapsed from home to delivery of the sample to the laboratory will certainly undergo changes in the analytical phase, resulting in inaccurate tests and with the possibility of errors [4].

It was verified in the present study the prevalence of the use of sterile collectors, which are adequate for the urine summary test. It is of great relevance the use of appropriate container for sample collection, which must be sterile, have wide mouth to aid the use by female users, have round and wide bottom to prevent tipping, besides being transparent, facilitating the visualization of the color and appearance of urine [13-14]. It is essential that

the nurse and his team provide guidance on the use of appropriate collector and correct handling, thus avoiding contamination of the sample.

It was possible to obtain relevant data related to the lack of intimate hygiene, which consists of cleaning the urogenital region with soap and water. This pre-analytical conduct concerning cleanliness is primordial since it reduces possible interferences in urinalysis. In a study conducted in the northwest of the state of Rio Grande do Sul - Brazil, it was revealed that urine samples showed nitrite and an increase in the number of bacteria due to lack of hygiene during collection [6].

When assessing the form in which the sample was collected, a significant percentage of users who withdrew the first urine stream was evidenced, configuring this as inappropriate conduct, since the recommended stream is the middle one, thus avoiding errors in the analytical phase and confusion in the interpretation of the final test results. Studies show that the collection of the middle or second stream is of great relevance in order to reduce contaminants from the urethra and genital region [6].

Although there was a high rate of individuals who reported having received previous guidance, 43.9% showed insufficient knowledge on the subject. This fact shows that there is still a significant number of users who receive the request for the exam and are not properly oriented. Studies corroborate this finding by stating the difficulties experienced in everyday life, such as the overload of activities, lack of knowledge of the proper technique, limitations in understanding, as well as the users' shame in asking questions to health professionals, which favors the absorption of incorrect information through friends and family [9-12]. It is also noteworthy that the professional who most provided information was the physician, justified by the predominance of tests requested by this specialty.

There was also a significant association between collection errors, such as inadequate intimate hygiene, prolonged time between collection and delivery of the sample, as well as incorrect jetting, with reduced knowledge about the laboratory test. Educational deficiencies favor reduced access to information and compromise the implementation of care, contributing to health inequalities and the generation of social inequities. It is verified that a low educational level can negatively affect socioeconomic and cultural aspects, as well as health conditions. Individuals with a lower level of education are more exposed to preventable risk factors, thus reaffirming the need for education as an instrument for the prevention of diseases and promotion of healthy practices [13].

Therefore, professionals should promote health education to users in order to explain the importance of proper handling for urine collection. Educational actions need to be established by all professionals that make up the health team, especially in PHC, since this service is one of the most sought after by the population. Thus, it is necessary to adopt practices for improvement when requesting urine summary test, such as providing guidance in a didactic way to facilitate users' understanding [14].

In light of this, among the requesting professionals, the nurse stands out as a transforming agent since he/she is closer to the patient. Therefore, it is one of their attributions to provide proper guidance, instructing users about the preparation for collecting the sample to be analyzed [12-14]. Thus, the need to promote health education is emphasized, dynamically showing the step-by-step of urine collection, with clear and easy-to-understand words, enabling the exchange of knowledge with users, in an open and welcoming way, seeking the clarification of doubts and thus strengthening the bond between user and professional.

The limitations of this study refer to the scarcity of this topic in the scientific literature, which made it difficult to analyze and discuss the results, and further research is needed on the topic at hand.

CONCLUSION

It is understood that the inadequate pre-analytical procedures found in this study and the lack of knowledge about the procedure to be followed for collecting the urine summary test are the result of a lack of guidance from the professionals involved, making it worrisome since it can lead to analytical errors. Therefore, the promotion of health education through social participation is necessary, aiming at reducing the social vulnerability of errors that occur due to lack of knowledge and, thus, reducing the inadequate conducts that interfere in the result of the urine, as well as the costs related to the collection of a new test to confirm the results.

It is emphasized that this study offers a great contribution to society in the sense of knowledge about the proper collection procedure, with the construction of strategies that enable the reduction of factors that negatively interfere in the pre-analytical phase, and to health professionals, with emphasis on the nursing team, regarding the provision of concise information to patients.

The importance of the request of this test by primary care nurses is emphasized since it improves both the professional's understanding of the patient's clinical condition and the flow of the service in terms of a faster resolution of demands. In addition, the importance of developing activities with educational approaches about the urine collection process is highlighted.

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HOW TO REFERENCE THIS ARTICLE:
Pedrosa SC de S, Ferreira MAM, Guimarães KSL, Guimarães WFG, Barbosa KTF. Conducts that may interfere in the pre-analytical phase of the urine summary test. Cogitare enferm. [Internet]. 2021 [accessed "insert day, monh and year"]; 26. Available from: http://dx.doi.org/10.5380/ce.v26i0.74085.

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Final approval of the version to be published - MAMF, KSLG, WFGG