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RENAL FUNCTION RECOVERY DURING HOSPITALIZATION AT A MEDICAL **CLINIC UNIT**

RECUPERAÇÃO DA FUNÇÃO RENAL DURANTE INTERNAÇÃO EM UNIDADE DE CLÍNICA **MÉDICA**

RECUPERACIÓN DE LA FUNCIÓN RENAL DURANTE HOSPITALIZACIÓN EN UNA UNIDAD DE CLÍNICA **MÉDICA**

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Objective: to identify the incidence of renal function recovery in patients hospitalized at a medical clinic unit. Method: prospective and longitudinal quantitative study, consisting of 23 patients who developed acute kidney injury (AKI). A structured questionnaire was used for data collection. A descriptive analysis of numerical variables was carried out and categorical variables were calculated by absolute and relative simple frequencies. The results are presented in mean value and standard deviation. **Results**: there was a predominance of men (56.5%), with an average age of 58 ± 17 years. The majority were conscious (73.9%) and bedridden (52.2%). The length of hospitalization was 68±77 days. According to the 'Kidney Disease: Improving Global Outcomes' (KDIGO) classification, most of the patients (60.9%) showed a risk for kidney damage (stage 1) and a lower percentage (17.4%) signaled renal failure (stage 3). The incidence of renal function recovery within the first month was 53.8%, while in the second and third months it was 66.7% and 100%, respectively. Conclusion: there was progressive renal function recovery in the first three months after kidney injury. In this context, identifying the percentage of renal function recovery makes it easier both to design and establish an intervention plan and this minimizes the progression of AKI to a chronic condition, in addition to contributing to a safe and effective care. Descriptors: Acute Kidney Injury; Prevention; Internal Medicine; Health Evaluation; Risk Factors; Nursing.

RESUMO

Objetivo: identificar a incidência de recuperação da função renal em pacientes internados em unidade de clínica médica. Método: estudo quantitativo, prospectivo e longitudinal, composto por 23 pacientes que desenvolveram lesão renal aguda (LRA). Utilizou-se um questionário estruturado para coleta de dados. Realizou-se análise descritiva das variáveis numéricas e as variáveis categóricas foram calculadas por frequências simples absolutas e relativas. Os resultados são apresentados em média e desvio padrão. Resultados: houve predomínio do sexo masculino (56,5%), com idade média de 58±17 anos. A maioria estava consciente (73,9%) e acamada (52,2%). O tempo de internação foi de 68±77 dias. Pela classificação "Kidney Disease: Improving Global Outcomes" (KDIGO), a maioria dos pacientes (60,9%) apresentou risco de lesão renal (estágio 1) e um percentual menor (17,4%) sinalizou falência renal (estágio 3). A incidência de recuperação da função renal no primeiro mês foi de 53,8%, enquanto no segundo e no terceiro mês foi de 66,7% e 100%, respectivamente. *Conclusão*: houve recuperação progressiva da função renal nos três primeiros meses após lesão renal. Nesse contexto, identificar o percentual de recuperação da função renal facilita tanto a elaboração como o estabelecimento de plano de intervenção e isso minimiza a progressão da LRA para uma condição crônica, além de contribuir para uma assistência segura e eficaz. Descritores: Lesão Renal Aguda; Prevenção; Medicina Interna; Avaliação em Saúde; Fatores de Risco; Enfermagem.

RESUMEN

Objetivo: identificar la incidencia de recuperación de la función renal en pacientes hospitalizados en una unidad de clínica médica. Método: estudio cuantitativo, prospectivo y longitudinal, compuesto por 23 pacientes que desarrollaron lesión renal aguda (LRA). Se utilizó un cuestionario estructurado para la recogida de datos. Se realizó un análisis descriptivo de las variables numéricas y las variables categóricas se calcularon mediante frecuencias simples absolutas y relativas. Los resultados se presentan en valor medio y desviación estándar. Resultados: predominaron los hombres (56,5%), con una edad promedio de 58±17 años. La mayoría estaba consciente (73,9%) y postrada en cama (52,2%). La duración de hospitalización fue de 68±77 días. Según la clasificación "Kidney Disease: Improving Global Outcomes" (KDIGO), la mayoría de los pacientes (60,9%) mostró un riesgo de lesión renal (fase 1) y un porcentaje menor (17,4%) ha señalado fallo renal (fase 3). La incidencia de recuperación de la función renal en el primer mes fue de 53,8%, mientras que en el segundo y tercer meses fue de 66.7% y de 100%, respectivamente. Conclusión: hubo recuperación progresiva de la función renal en los primeros tres meses después de la lesión renal. En este contexto, identificar el porcentaje de recuperación de la función renal hace que sea más fácil diseñar y establecer un plan de intervención y esto minimiza la progresión de la LRA a una condición crónica, además de contribuir a una atención segura y efectiva. Descriptores: Lesión Renal Aguda; Prevención; Medicina Interna; Evaluación en Salud; Factores de Riesgo; Enfermería.

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INTRODUCTION

Acute kidney injury (AKI) is an abrupt, complex, and potentially reversible clinical condition. By accumulating an increasing incidence rate among hospitalized patients, it expresses a significant risk for the development of end-stage kidney disease.^{1,2}

The incidence rate of AKI during a period hospitalized at the intensive care unit ranges from 17% to 35%.^{3,4} Thus, recognizing and preventing the progression of this pathology to a chronic condition that requires renal replacement therapy, on an early basis, minimizes complications, problems, and financial burden on the health system.^{3,5}

hospital setting, the hypertensive black-skinned patients, people, people, patients with cardiovascular diseases and/or kidney diseases are at a higher risk of developing AKI. The implementation of glomerular filtration rate monitoring strategies may be the key identification of renal dysfunction.3

The identification of AKI is based on the 'Kidney Disease: Improving Global Outcomes' (KDIGO) classification, which defines AKI as creatinine increase ≥ 1.5 times in relation to the baseline in a period up to 7 days and/or a < 0.5 mL/kg/h decrease for 6 hours in urine output. The performance of serum creatinine and urine output as biological markers in clinical practice have shown to be key for the staging of kidney impairment.⁶

Given the degree of renal dysfunction, according to the KDIGO classification, the patient is stratified into stages: stage 1, defined by absolute increase in creatinine 1.5-1.9 times the baseline ($\geq 0.3 \text{ mg/dL}$) - lower severity; stage 2 is characterized by an increase greater than 2.0-2.9 times in the baseline serum creatinine (intermediate severity); and stage 3, a 3.0 times increase, or $\geq 4.0 \text{ mg/dL}$ ($\geq 353.6 \text{ mmol/L}$), in relation to the baseline creatinine or serum creatinine $\geq 4.0 \text{ mg/dL}$ ($\geq 353.6 \text{ mmol/L}$), in addition to patients requiring renal replacement therapy (higher severity).

Studies describe that the occurrence of AKI in hospitalized patients implies an increase in mortality.^{7,8} On the other hand, assessing the extent of kidney impairment is still limited by the absence of a universally accepted definition of kidney injury recovery.⁹

The literature signals different definitions, but most of the studies recognize renal function recovery as independence from dialysis at the time of hospital discharge. 10

To date, the best time to assess kidney injury recovery is not consensual. Some

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studies indicate that it should be assessed at the time of hospital discharge¹¹, 1 month after injury¹², or 1 year after injury, and the latter is the most appropriate period for assessment.¹³

The lack of consensus on the definition of renal function recovery not only stimulated the development of this study, but indicated the need to identify whether renal function recovery occurs among patients hospitalized at a medical clinic unit.

OBJECTIVE

• To identify the incidence rate of renal function recovery in patients hospitalized at a medical clinic unit.

METHOD

Quantitative, prospective, longitudinal study, conducted at the adult medical clinic unit of a public hospital in the Brazilian Federal District, within the period May to December 2016. The study had a convenience sample and it consisted of 23 patients who developed AKI during the length of hospital stay.

Patients older than 18 years, hospitalized at the medical clinic due to clinical-based problems, were included, and those with a history of emergency surgery, chronic kidney failure in stages 4 and 5, and renal transplantation were excluded.

A structured questionnaire was used for data collection. Patients were followed from admission to the medical clinic identification of AKI up to 3 months after renal dysfunction was identified. AKI was identified only through the creatinine criterion, with a \geq 0.3 mg/dL increase in creatinine⁶, because serum measurement routine is not deployed at the medical clinic, the study setting, and there are limitations to establish this practice along with the clinical staff and hospitalized patients.

Renal function recovery was established when the sCr/baseline sCr ratio was lower than or equal to 20%. The baseline creatinine adopted was the serum level registered at the time of admission to the medical clinic. The identification of AKI was based on the KDIGO classification. Reference values for both laboratory and hemodynamic measurements complied with the protocol of the State Department of Health of the Brazilian Federal District (SES/DF). As for laboratory tests: leukocytes = 3,800 to 9,800/mm³, urea = 20-40 mg/dL, sodium = 138 or 135 mEq/L, potassium = 3.5 to 5.0 mEq/L, serum creatinine (male) = 0.7-1.2 mg/dL;

serum creatinine (female) = 0.5-1.1 mg/dL. Hemodynamic measurements: heart rate = 60-100 bpm/min, systolic blood pressure = 120-80 to 139-89 mmHg, average arterial pressure = 60-80 mmHg, respiratory rate = 12-20 cycles/min, peripheral oxygen saturation (SpO²) = 95-100%, temperature = 35.8-37°C.

Descriptive analysis of numerical variables was performed by means of centrality measurements (mean, median, and 25 and 75 percentiles), and categorical variables were calculated by absolute and relative simple frequencies.

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The study project has been approved by the Research Ethics Committee of the Health Sciences Teaching and Research Foundation (FEPECS) of the SES/DF, under the Brazilian Certificate of Submission for Ethical Assessment (CAAE) no. 51576215.8.0000.5553.

RESULTS

We followed 23 patients who developed AKI. There was a predominance of men (56.6%) and brown-skinned people (52.2%). The average age was 58 ± 17 years, as displayed in Table 1.

Table 1. Distribution of patients according to demographic characteristics. Brasília, 2016.

Characteristics (n = 23)	N (%)	Mean (±SD)	Median (25-75%)
Men	13 (56.5)	-	-
Age (years)	-	58±17	61 (43-72)
Race			
White	9 (39.1)	-	-
Black	1 (4.3)	-	-
Brown	12 (52.2)	-	-
Indian	1 (4.3)	-	-
Marital status			
Single	8 (34.8)	-	-
Married	8 (34.8)	-	•
Widower	3 (13.0)	-	-
Divorced	3 (13.0)	-	-

Legend: SD = standard deviation.

Among the comorbidities, in addition to renal dysfunction, hypertension was more frequent (52.2%). Most of the patients were bedridden (52.2%), conscious (73.9%), with a body mass index (BMI) of $24.5\pm6.9~\text{kg/m}^2$. According to laboratory tests, the average creatinine clearance was $79\pm27~\text{mL/min}$, the

average serum potassium level was 4.4 ± 0.9 mmol/L, and the average hemoglobin was 10.3 ± 1.9 g/dL. Regarding hemodynamic variables, systolic blood pressure and diastolic blood pressure were altered in 52.2% and 14% of the cases, respectively (Table 2).

Table 2. Distribution of patients according to clinical characteristics. Brasília, 2016.

Characteristics (n=23)	N (%)	Mean (±SD)	Median (25-75%)
BMI (kg/m²)	-	25.1±6.9	24.5 (19.5 - 27.3)
Admission creatinine clearance	-	94±29	91.5 (66.3 - 118.9)
Motility			
Bedridden	12 (52.2)	-	-
Walking	11 (47.8)	-	-
Consciousness			
Conscious	17 (73.9)	-	-
Torporous	4 (17.4)	-	-
Comatose	2 (8.7)	-	-
Oxygen therapy			
Ambient air	15 (65.2)	-	-
Nasal cannula	2 (8.7)	-	-
Tracheostomy	6 (26.1)	-	-
Comorbidities			
Diabetes	6 (26.1)	-	-
Hypertension	12 (52.2)	-	-
Alcoholism	9 (39.1)	-	-
Smoking	7 (30.4)	-	-
Respiratory illnesses	3 (13.0)	-	-
Cardiopathy	6 (26.1)	-	-
Hepatopathy	3 (8.7)	-	-
Renal dysfunction	23 (100.0)	-	-

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Heart rate	-	85±12	85.1 (76.4-96.1)
Altered systolic blood pressure	12 (52.2)	-	-
Altered diastolic blood pressure	14 (60.9)	-	-
Laboratory tests			
Average creatinine clearance	-	79±27	77.5 (62.7-102.4)
Average potassium	-	4.4±0.9	4.3 (3.9-4.6)
Hemoglobin	-	10.3±1.9	9.9 (8.9-11.1)
Length of hospital stay (days) ^a	-	68±77	33 (25-98)

Legend: SD = standard deviation; BMI = body mass index; a = calculation of the length of hospital stay: date of hospital discharge - date of hospital admission.

It was found that patients remained at the medical clinic for about 33 days. Kidney impairment was identified using the KDIGO classification and this allowed us to recognize that the majority (60.9%) had a risk for kidney injury (stage 1) according to the creatinine criterion (Table 3).

Table 3. Classification of patients (n = 23) into renal dysfunction stages according to the creatinine criterion of the KDIGO classification. Brasília, 2016.

Stage	Creatinine criterion	
	N (%)	
Stage 1 - Risk	14 (60.9)	
Stage 2 - Injury	5 (21.7)	
Stage 3 - Failure	4 (17.4)	

The percentage of patients who evolved with renal function recovery ranged from

53.8% to 100% after the first 3 months since AKI (Table 4).

Table 4. Renal function recovery of patients hospitalized at the medical clinic unit. Brasília, 2016.

Period	Recovery N (%)
In the 1st month (n = 13)	7 (53.8)
In the 2 nd month (n = 6)	4 (66.7)
In the 3 rd month (n = 5)	5 (100)

Many patients had insufficient data for this calculation.

DISCUSSION

The impact of AKI on hospitalized patients is unquestionable, given the association with severe complications, mortality, and increased health care expenditures.¹⁴

It is known that patients with AKI can progress with various outcomes, ranging from complete renal function recovery to end-stage chronic kidney disease.¹⁵

Due to the increase in life expectancy and the number of comorbidities in population, the incidence of AKI has risen in recent years. The findings of this study, as well as other scientific evidence, highlight hypertension, systemic arterial diabetes mellitus, and obesity as some of the risk comorbidities for developing AKI. 15-6 Such clinical conditions are associated with hemodynamic, structural, and histological changes, increasing the predisposition for nephropathy, hypertensive nephrosclerosis, and segmental and focal glomerulosclerosis and, consequently, kidney injury. 17-9

This study showed that men are more predisposed to AKI when compared to women, a condition justified by estrogen inhibition

and androgen activation. 20-3 In addition, a high incidence of the elderly was observed, a characteristic recognized as a major risk factor for AKI.3,20,24 It is known that the elderly are 3.5 times more likely to evolve with AKI during hospitalization and one of the associated factors is represented progressive reduction in the glomerular over filtration life (around rate mL/min/1.73 m² per year after people reach 30 years old). 15

According to the KDIGO classification, using the creatinine criterion, this study identified that patients with AKI were at an early stage of disease (risk for kidney damage), unlike other evidence in which the stage of kidney failure has been highlighted as a majority. However, it is worth emphasizing that the incidence and degrees of renal dysfunction vary according to the geography of the scenario where the study is carried out, as well as to the concepts adopted.¹⁸

Mortality rates are expected to increase having progression of the early stages of renal dysfunction as a basis, something which implies a longer hospital stay and worse prognosis concerning renal function recovery.²⁵⁻⁶

Other studies also identified renal function recovery ranging from 20 to 70% of the cases. 13,27 Scientific evidence indicates that, when renal function reversal occurs within 72 hours of its onset, it is possible to observe better long-term outcomes. 28-9 Surely, additional treatment measures after 48 hours of kidney impairment may prevent the progression of the disease. 9

Since AKI is a potentially preventable condition, there emerges a challenge for the health team, especially nurses, in order to identify factors related to the occurrence of AKI and the planning of effective preventive strategies, as well as the need to identify factors that contribute to renal function recovery, leading to the development of intervention plans aimed at preventing complications and AKI progression to a chronic condition.

The limitations of this study may be pointed out as the difficulty of access to registers in the electronic medical records and to patient compliance, a factor that contributed to the small sample size.

CONCLUSION

We noticed a progressive increase in the number of patients who evolved with renal function recovery during the follow-up period. Renal function recovery occurred in all patients third in the month identification of AKI. In this context, identifying the percentage of renal function recovery becomes necessary for adequate planning and establishment of an intervention plan in order to minimize the progression of AKI to a chronic condition, in addition to contributing to a safe and effective care.

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