Clinical Accuracy of RIFLE and Acute Kidney Injury Network (AKIN) Criteria for Predicting Hospital Mortality in Critically Ill Patients with Multi-Organ Dysfunction Syndrome

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Background: *The Acute Dialysis Quality Initiative (ADQI) group developed RIFLE criteria and the Acute Kidney Injury Network published AKIN classification that modified form RIFLE criteria.*
Objective: *The authors aimed to compare the ability of RIFLE and AKIN criteria to measure the incidence of acute kidney injury (AKI) and to predict clinical outcomes in critically ill patients.*
Material and Method: *A retrospective cohort study, in Siriraj Hospital, Bangkok. The critically ill patients admitted to medical intensive care unit (ICU) during January 2006-December 2008 were classified according to the maximum RIFLE and AKIN classification reached during their hospital stay. Demographic data, hospital mortality, hospital length of stay, need of renal replacement therapy was collected.*
Results: *Three hundred patients were included in this study, AKI occurred in 200 (66.7%) patients: Risk 12.7%, Injury 20.7%, Failure 33.3% defined by RIFLE criteria. According to AKIN criteria, AKI occurred 230 (76.7%) patients: stage 1 16%, stage 2 13.3% and stage 3 47.3%. AKIN classification was diagnosed AKI, approximately 10% more than RIFLE (p < 0.001). The hospital mortality was 51.7% and the mortality in patients with AKI was significantly higher than patients without AKI (p < 0.001). The predictive ability using the AUC-ROC showed poor discrimination for the prediction of mortality of both RIFLE and AKIN: 0.63 and 0.69, respectively. However, AKIN showed superior prediction of mortality than RIFLE (p = 0.003). The APACHE II had the best discriminative accuracy for mortality (AUC = 0.80), followed by the SAPS3 scores (AUC = 0.77) and SAPS2 (AUC = 0.76).*
Conclusion: *AKIN criteria improved sensitivity for detection of AKI and its discrimination for prediction of in-hospital mortality was better than that of RIFLE criteria. However, APACHE II had the best discriminative value for prediction of mortality in the critically ill patients.*

Keywords: *RIFLE, AKIN, Acute kidney injury, Acute renal failure, Critically ill patient, Comparison*

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Acute renal failure (ARF) is a common and serious complication in critically ill patients and is significantly associated with morbidity and mortality[1-3]. Early detection of ARF may lead to prompt prevention of severe ARF and a decrease in mortality. Unfortunately, the definitions of ARF have wide variability with more than 30 concepts describing ARF, with a reported incidence of 1-25% depending on the definition used[4-6]. These multiple definitions make for clinical confusion and difficulty in the diagnosing of this condition, including when to use data for evaluation between studies andfor testing therapies[7].

In 2004, the Acute Dialysis Quality Initiative (ADQI) group developed and published a consensus classification of acute kidney injury (AKI), RIFLE criteria, to characterize the complete spectrum of acute renal dysfunction from patients with early or mild forms to severe forms[5]. The RIFLE criteria consists of 3 grades of severity of AKI, risk (R), injury (I), and failure (F) and two outcome classes-sustained loss (L) of kidney function and end-stage kidney disease (E) (Table1).

More recently, the Acute Kidney Injury Network (AKIN) proposed AKIN classification, which modified from RIFLE criteria[8] (Table1). The major differences between the two classifications are; (i) AKIN defines AKI based on shorter time frame (48 h)

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than RIFLE does (7 days), (ii) the calculation of estimated glomerular filtration rate (eGFR) is included in RIFLE, but not in AKIN, (iii) renal replacement therapy (RRT) requirement is not allocated in severity class of RIFLE, but it is assigned in stage 3 of AKIN. Urinary output criteria are similar in both classifications (Table 1). The reason for these changes was to improve the sensitivity and early detection of AKI. There have been few studies regarding the comparison between the two definitions in critically ill patients. Moreover, most of such studies were reported from the Western countries.

In the present study, the authors aimed to compare the ability of RIFLE and AKIN criteria to measure the incidence of AKI and to predict clinical outcomes in critically ill patients. The authors also assess the performance of both classifications in comparison with well established prognostic scores such as APACHE II, SAPS2, and SAPS3.

Material and Method

Patient population

The authors performed a retrospective cohort study in critically ill patients admitted to medical intensive care unit (ICU) of Siriraj Hospital (Bangkok, Thailand), a tertiary care referral center, during January 2006 to December 2008. Patients aged under 15 years, with end stage renal disease treated with renal replacement therapy or kidney transplant and those who did not have complete data were excluded. The institutional ethics committee of Siriraj Hospital gave permission to collect data for the present study. Baseline characteristics, diagnosis, renal replacement therapy requirement and in-hospital mortality of the patients were reviewed from medical charts and the ICU databases.

Identification of AKI

AKI was defined and classified according to the RIFLE and AKIN criteria (Table 1). In the present study, the authors used only the glomerular filtration rate (GFR)/serum creatinine criteria, because the data of urine output was unavailable in some patients.

The maximum RIFLE was calculated considering the maximum of serum creatinine compared with baseline creatinine. The authors evaluated grading of severity, defined as “class”-Risk (R), Injury (I) and Failure (F). The baseline serum creatinine was the lowest serum creatinine within 3 months before this admission. If the patients admitted without any baseline of renal function, the authors estimated baseline creatinine according to the modification of diet in renal disease (MDRD) equation, assuming normal glomerular filtration rate (GFR) of 75 ml/min[9].

In the other hand, the maximum AKIN was reported by using at least two serum creatinine values within 48 hours and defined these as “stage” 1, 2 and 3. The reference creatinine was the lowest creatinine within a 48-hour interval.

Acute kidney injury (AKI) was defined as patients in all stages of acute renal dysfunction consistent with the RIFLE and AKIN criteria. A patient without acute kidney injury was defined when that patient did not include in the three categories of the RIFLE and AKIN criteria.

General scoring systems

The prognostic performances of the RIFLE and AKIN criteria were compared to the general-ICU

Table 1. Description of RIFLE and AKIN classifications for acute kidney injury

RIFLE criteria	Serum creatinine criteria	UO criteria
Risk	Increase in serum creatinine $\geq$ 1.5X baseline or decrease in GFR $\geq$ 25%	< 0.5 ml/kg/h for $\geq$ 6 h
Injury	Increase in serum creatinine $\geq$ 2.0X baseline or decrease in GFR $\geq$ 50%	< 0.5 ml/kg/h for $\geq$ 12 h
Failure	Increase in serum creatinine $\geq$ 3.0X baseline or decrease in GFR $\geq$ 75% or an absolute serum creatinine $\geq$ 4 mg/dL with an acute rise of at least 0.5 mg/dL	< 0.3 ml/kg/h $\geq$ 24 h or anuria $\geq$ 12 h
Loss	Complete loss of kidney function > 4 wks	
ESKD	Complete loss of kidney function > 3 mos	
AKIN classification	Serum creatinine criteria	UO criteria
Stage 1	Increase in serum creatinine $\geq$ 0.3 mg/dL or increase to $\geq$ 150-199% (1.5- to 1.9-fold) from baseline	< 0.5 ml/kg/h for $\geq$ 6 h
Stage 2	Increase in serum creatinine to 200-299% (> 2-2.9 fold) from baseline	< 0.5 ml/kg/h for $\geq$ 12 h
Stage 3	Increase in serum creatinine to $\geq$ 300% ($\geq$ 3-fold) from baseline or serum creatinine $\geq$ 4 mg/dL with an acute rise of at least 0.5 mg/dL or initiation of RRT	< 0.3 ml/kg/h $\geq$ 24 h or anuria $\geq$12 h

severity scoring systems; Acute Physiology And Chronic Health Evaluation II (APACHE II), Simplified Acute Physiology Score 2 (SAPS2) and SAPS3 scores. As described in the original studies, APACHE II and SAPS2 scores were calculated by using the most deranged physiological value within the first 24-hour of ICU admission(10,11). SAPS3 was evaluated based on the data within 1 hour after admission(12). The predicted mortality for APACHE II, SAPS2 and SAPS3 were calculated by using the origin regression equation(10-12).

Statistical analysis

The data was collected and statistical analysis was evaluated with the SPSS version 16.0 (SPSS Inc., Chicago, IL, USA). The continuous variables with normally distributed were described as mean $\pm$ standard deviation and those with non-normally distributed were reported as median with inter-quartile range (IQR). The categorical variables were expressed as number of cases and percentage of cases. Comparisons between RIFLE and AKIN classes were performed using Chi-square tests and Mann Whitney U test for continuous variables and categorical variables, respectively. The agreement of RIFLE and AKIN classification was done by calculation of the weighted kappa defined by Altman DG(13). Briefly, the weighted kappa of 0.81 to 1.00 implied verygood in the strength of agreement, while the value of 0.61 to 0.80, 0.41-0.60, 0.21-0.40 and $\leq$ 0.20 was consistent as good, moderate, fair and poor agreement, respectively. The discriminating ability of RIFLE and AKIN classifications as well as that of the general scoring systems (APACHE II, SAPS2, SAPS3) to predict in-hospital mortality were assessed by the area under the receiver operator characteristic (aROC) curve. An AUC-ROC value of 0.97 to 1.0 indicated excellent, 0.87 to 0.96 indicated very good, 0.76 to 0.87 indicated good, and 0.50 to 0.75 indicated no clinical useful value(14). AUC-ROC values were compared according to the method of Hanley and McNeil(14). Multivariate logistic regression analysis was employed to evaluate the best predictive value of mortality by the goodness of fit test.

Results

During the study period, 300 patients were included in the present study. The median age was 60 (IQL 43-74) years and 152 patients (52%) were males. Thirty percent of all patients had Glasgow Coma Scale (GCS) below eight points. Mean APACHE II, SAPS 2, and SAPS3 scores were 23.7 $\pm$ 9.3, 50.0 $\pm$ 19.7 and 68.7 $\pm$ 16.8, respectively. Baseline serum creatinine of the patients studied was approximate 0.9 (IQL 0.6-1.2) mg/dl. Patient baseline characteristics according to hospital mortality are presented in Table 2.

Acute kidney injury classified by RIFLE and AKIN criteria

Acute kidney injury (AKI) occurred in 200 (66.7%) patients defined by RIFLE criteria: risk in 12.7%, injury in 20.7%, and failure in 33.3%. According to AKIN criteria, AKI occurred in 230 (76.7%) patients: stage 1

Table 2. Patients baseline characteristicsaccording to hospital mortality

	All patients (n = 300)	Hospital mortality		p
		Survivor (n = 145)	Non-survivor (n = 155)	
Age, yr	60 (42-74)	59 (41-72)	61 (45-77)	0.21
Male (%)	156 (52%)	73 (50.3%)	83 (53.5)	0.58
ICU, day	7 (3-15)	8 (4-15)	6 (2-15)	0.9
Hospital, day	17 (9-39)	21 (12-43)	15 (6-35)	0.2
GCS < 8	92 (30.7%)	19 (13.1%)	73 (47.1%)	< 0.001*
AKI by RIFLE	200 (66.7%)	81 (55.9%)	119 (76.8%)	< 0.001*
AKI by AKIN	230 (76.7%)	94 (64.8%)	136 (87.7%)	< 0.001*
APACHE II score	23.7 $\pm$ 9.3	18.3 $\pm$ 7.6	28.8 $\pm$ 7.9	< 0.001*
SAPS2 score	51.0 $\pm$ 19.7	39.6 $\pm$ 15.1	59.7 $\pm$ 18.5	< 0.001*
SAPS3 score	68.7 $\pm$ 16.8	60.3 $\pm$ 14.3	76.6 $\pm$ 15.1	< 0.001*
Cr baseline (mg/dL)	0.9 (0.2-5.8)	0.8 (0.2-4.8)	1.0 (0.2-5.8)	0.02*
RRT (%)	102 (34%)	32 (22.1%)	70 (45.2%)	< 0.001*

Normally distributed values are reported as mean $\pm$ standard deviation, and non-normally distributed values are reported as median (inter-quartile range) in 16%, stage 2 in 13.3% and stage 3 in 47.3% (Table 3). As expected, AKI was diagnosed by AKIN classification approximately 10.0% more than did by RIFLE criteria ($p < 0.001$). The hospital mortality was 51.1%. Hospital mortality in patients with AKI, defined by both RIFLE and AKIN criteria, was significantly higher than patients without AKI ($p < 0.001$), especially in RIFLE-F and AKIN-3 groups. The progressive elevation in hospital mortality was associated with an increasing in stage of the RIFLE criteria. In contrast, this phenomenon was not found with the use of AKIN criteria, which demonstrated that patients in AKIN-1 had higher hospital mortality than those in AKIN-2 (Table 3).

Agreement of RIFLE and AKIN definitions

Table 4 shows agreement of RIFLE and AKIN criteria according to identification across classes. There was relatively good overall agreement of the RIFLE and AKIN criteria, with the weight kappa of 0.78[13]. Of all cases, misclassifying occurred in 62 patients (20%). As shown in Table 4, there were a greater number of patients with AKIN-1 and AKIN-3 than those with RIFLE-R and RIFLE-F, respectively (AKIN-1 vs. RIFLE-R: 16% vs. 12.7%; AKIN-3 vs. RIFLE-F: 47.3% vs. 33.3%). Of note, 6.7% of patients classified as AKIN-1 had no-AKI by RIFLE, where as no patient in RIFLE-R had no-AKI by AKIN.

RRTs including continuous veno-venous hemofiltration (CVVH), intermittent hemodialysis (IHD), and sustained low efficiency dialysis (SLEDD), were performed in 102 patients (34%). Because of hemodynamic instability, 78 of 102 patients (76.4%) underwent CVVH. Patients who required RRT (irrespective of RIFLE and AKIN classes) had a very poor outcome with a mortality of 68%. The authors observed a substantial disagreement between RIFLE and AKIN in classifying patients who required RRT (Table 4). As defined by AKIN, all patients who received RRT were classified in AKIN-3, whereas 10 (9.8%) of patients who received RRT were classified in RIFLE-no AKI. 9.8%, 21.6% and 58.8% of patients undergoing RRT was grouped in RIFLE-R, RIFLE-I and RIFLE-F, respectively.

Prognostic factors associated with mortality-ROC curves and calibration

In order to compare predictive value of the two classifications, we found that both definition sets of AKI showed different discrimination for the prediction of mortality as evaluated by the AUC: 0.63 (95% CI, 0.577 to 0.688) for RIFLE and 0.69 (95% CI,

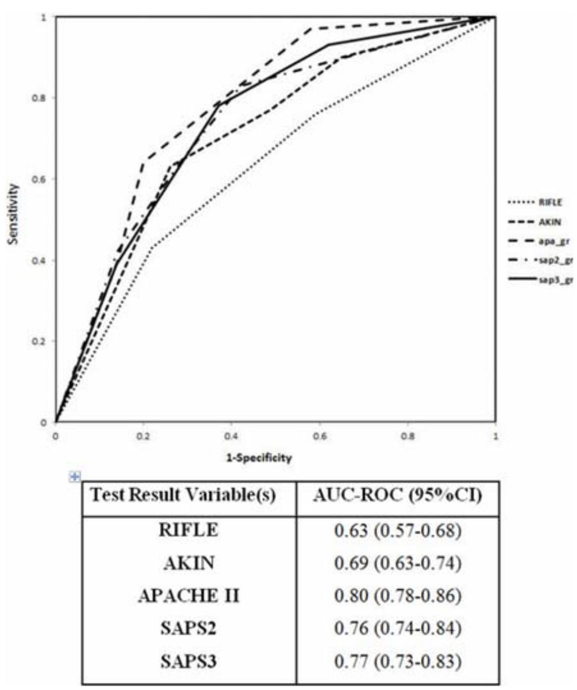
Table 3. Incidence of AKI, hospital mortality, and predictive ability for hospital mortality# stratified by RIFLE and AKIN classifications

	RIFLE classification					AKIN classification			
	n = 300	Hospital mortality	Odd ratio 95% CI	P		n = 300	Hospital mortality	Odd ratio 95%CI	p
No AKI	100 (33.3%)	36 (36%)	1		No AKI	70 (23.3%)	19 (27.1%)	1	
AKI	200 (66.7%)	119 (59.5%)	2.61 (1.59-4.29)	0.006	AKI	230 (76.7%)	136 (59.1%)	3.88 (2.15-6.99)	< 0.001
Risk	38 (12.7%)	20 (52.6%)	1.98 (0.93-4.21)	0.78	Stage1	48 (16.0%)	21 (43.7%)	2.09 (0.96-4.54)	0.063
Injury	62 (20.7%)	33 (53.2%)	2.02 (1.06-3.86)	0.32	Stage2	40 (13.3%)	15 (37.5%)	1.61 (0.70-3.69)	0.26
Failure	100 (33.3%)	66 (66.0%)	3.45 (1.93-6.17)	< 0.001	Stage3	142 (47.3%)	100 (70.4%)	6.39 (3.38-12.1)	< 0.001

presented as Odd ratio, (95%CI) determined from separate logistic regression models

Table 4. Agreement of RIFLE and AKIN criteria (number of patients and percentage of entire study cohort)

Definition		AKIN classification				
		No AKI	Stage 1	Stage 2	Stage 3	Total
RIFLE classification	No AKI	70 (23.3%)	20 (6.7%)	-	10 (3.3%)	100 (33.3%)
	Class R	-	28 (9.3%)	-	10 (3.3%)	38 (12.6%)
	Class I	-	-	40 (13.3%)	22 (7.3%)	62 (20.6%)
	Class F	-	-	-	100 (33.3%)	100 (33.3%)
	Total	70 (23.3%)	48 (16%)	40 (13.3%)	142 (47.3%)	300 (100%)



Test Result Variable(s)	AUC-ROC (95%CI)
RIFLE	0.63 (0.57-0.68)
AKIN	0.69 (0.63-0.74)
APACHE II	0.80 (0.78-0.86)
SAPS2	0.76 (0.74-0.84)
SAPS3	0.77 (0.73-0.83)

Fig. 1 ROC curves for RIFLE, AKIN, APACHE II, SAPS2 and SAPS3 predicting all cause hospital mortality

0.638 to 0.746) for AKIN, respectively. AKIN achieved more discriminatory power of mortality than RIFLE did ($p = 0.003$). Therefore, the authors compared discriminative ability of both classifications for AKI and well-established prognostic scores namely APACHE II, SAPS2 and SAPS3. Based on the area under the ROC curves, the APACHE II had the best discriminative accuracy for mortality (AUC = 0.80, 95% CI, 0.78 to 0.86), followed by the SAPS3 scores (AUC = 0.77, 95% CI 0.73 to 0.83) and SAPS2 (AUC = 0.76, 95% CI 0.74 to 0.84), while RIFLE and AKIN scores had poorer discrimination values. (AUC = 0.63 for RIFLE; 0.69 for AKIN) (Fig. 1).

Discussion

To date, RIFLE classification has been documented as a simple and available clinical tool to classify AKI in different populations such as in the ICU patients, in cases undergoing cardiac surgery and in non-ICU patients. The classification stratified by RIFLE was a significant predictive factor for hospital mortality, with an increase in odds ratios from Risk to Failure[15]. After the development of AKIN criteria, the efforts to compare the accuracy between both criteria have been done in a number of studies. Of these, the two largest studies were performed using the Australia and New Zealand Intensive Care Society (ANZICS) database (n = 120,123) and the SAPS3 database (n = 6,784)[16,17]. Both studies demonstrated that, compared to the RIFLE criteria, the AKIN criteria do not improve the sensitivity, robustness and predictive ability of the classification of AKI. However, both studies were evaluated by the changes of serum creatinine and urine output during only first 24h (ANZICS) and 48h (SAPS3) after ICU admission and without including a requirement of renal replacement therapy in the analysis, these changes do not comply with the original publication[5,8]. These might mislead if one infers such a conclusion in other situations and in different populations. Establishment of a uniform definition for AKI applicable in a variety of patient populations is necessary.

The authors conducted a single-center study, with 300 critically ill patients in a medical ICU of a tertiary care referral center.

Despite sufficient overall agreement between the two classifications, there were some variations in allocation for patients to a given stage of AKI. In the present study, AKIN criteria significantly identified 10.0% more patients with AKI, (76.7% in AKIN and 66.7% in RIFLE, $p < 0.001$), and increased the number of patients classified as AKIN-1 (16%), when compared to RIFLE-F (12.7%). The difference originated from lowering the threshold in diagnosis of AKI in AKIN criteria from increasing creatinine $\geq$ 1.5x to minimal change of creatinine $\geq$ 0.3 mg/dL, leading to improved sensitivity for diagnosis AKI. Additionally, AKIN criteria lead to over-diagnosis of AKI patients undergoing cardiac surgery due to fluid accumulation[18].

An interesting finding of our investigation was the relative disagreement about patients who required RRT stratified by both classification systems. All of patients receiving RRT (102 patients, 34%) were categorized in AKIN-3, but using RIFLE criteria these patients were labeled in both non-AKI group (n = 10) and AKI group (n = 92). Only 60 patients were in RIFLE-F, the remaining 22 and 10 cases were defined as RIFLE-I and RIFLE-R, respectively (Table 4). This is caused by the fact that some patients received RRT due to the indications other than azothemia (rising of creatinine) such as severe metabolic acidosis, hyperkalemia, hypercatabolic state, or volume overload, where the rising of serum creatinine did not meet the criteria of RIFLE class F. Our data indicate that patients who required RRT had a very poor outcome with a mortality rate of 68% (Table 2). Of note, the high incidence of RRT in our patients (34%) may lead to better discrimination for the prediction of mortality by AKIN (AUC: 0.69 (95% CI, 0.638 to 0.746)) than by RIFLE (AUC: 0.63 (95% CI, 0.577 to 0.688)) ($p = 0.003$ using Z-test: Hanley & McNeil method). In this respect, the predictive value of RIFLE may increase if all patients with RRT are staged in the highest possible class RIFLE-F, as done in the AKIN definition.

The present study reported a hospital mortality of 51% in all populations studied and significantly higher mortality in patients with AKI than in patients without AKI ($p < 0.001$).Even if AKIN criteria provided significantly higher discrimination of mortality beyond RIFLE in our patients, both definitions still had poor discriminative ability for the prediction of mortality, with the AUC of 0.63 by RIFLE and 0.69 by AKIN class. In contrast, previous studies had shown that both criteria provided good discrimination and AKIN criteria could not improve the ability in predicting hospital mortality of ICU patients when compared to RIFLE[15-17,19,20]. Lopes and colleagues reported the discrimination of both definitions in critically ill patients, with an AUC of 0.73 for RIFLE criteria and 0.75 for AKIN criteria ($p = 0.72$)[19]. Compared to the present study, both organ specific scoring systems, RIFLE and AKIN, showed better ability to predict hospital mortality in surgical patients, with a reported AUC of 0.88-0.94[18,21,22]. Moreover, no significant differences between both classifications were found in such population. There were some explanations for the difference between ours and those studies. First, in the present study the authors included only the patients in medical ICU, but in the other studies, they used the data from surgical patients or mixed medical and surgical patients. Second, almost all of our patients were in severely critical situations, on ventilator support, on vasopressor and had multiorgan failure, as determined by a high severity scores (APACHEII: 24, SAPS2: 60), whereas cases in other reports had a lower severity score than those in the present study.

Because of all of our patients were diagnosed as multiorgan dysfunction syndrome (MODS), the authors then investigated the predictive ability for mortality of the general severity scoring systems namely APACHE II, SAPS2, and SAPS3. Based on the area under the ROC curves, APACHE II score had the best discriminative accuracy for hospital mortality (AUC = 0.80), followed by SAPS2 and SAPS3, compared to the ROC of 0.63-0.69 by RIFLE and AKIN.

The authors argue that in medical patients especially those with high degree of severity and MODS, the organ specific scoring systems; RIFLE and the AKIN, are suitable to provide a uniform definition to help researchers and clinicians to classify the extent of renal dysfunction. However, for predicting clinical outcome, namely mortality of such a specific population, the general severity scoring systems such as APACHE II, SAPS2 and SAPS3 scores provide more accuracy than the specific renal scoring systems, both RIFLE and AKIN.

The present study is limited by the fact that the population was relatively small and reflective of a single tertiary care medical center, which limits the implication in other populations. Second, the urine output did not be utilized in the present study because lack of complete data for some patients. The authors might miss some cases with RIFLE-F who were identified the severity of renal dysfunction by using the urine output criteria. However, in a systemic review, the relative risk of death in studies that used both changes in serum creatinine level and urine output criteria to assess the severity of AKI was lower than in studies that used the creatinine criteria only[15].

Potential conflicts of interest

None.

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ความแม่นยำในการทำนายอัตราการเสียชีวิตในโรงพยาบาลโดยการใช้ RIFLE และ AKIN criteria ในผู้ป่วยวิกฤตที่มีการทำงานของอวัยวะล้มเหลวหลายอวัยวะ

รณิษฐา รัตนะรัต, ปิณิดา สกุลรัตนศักดิ์, ณัฐกานต์ ตังควัฒนกุล, ฉัตรี หาญทวีพันธุ์

วัตถุประสงค์: *เพื่อเปรียบเทียบความสามารถของ RIFLE และ AKIN criteria ในการบอกความชุกของภาวะไตวายเฉียบพลัน (Acute kidney injury, AKI) รวมถึงความแม่นยำในการทำนายอัตราการเสียชีวิตในผู้ป่วยวิกฤต*

วัสดุและวิธีการ: *คณะผู้นิพนธ์ได้ทำการศึกษาย้อนหลังในผู้ป่วยวิกฤตของภายวิชาอายุรศาสตร์ โรงพยาบาลศิริราช ตั้งแต่มกราคม พ.ศ. 2549 ถึง ธันวาคม พ.ศ. 2551 โดยแบ่งผู้ป่วยเป็นกลุ่มตามระดับ RIFLE และ AKIN criteria ที่สูงที่สุด ระหว่างรับการรักษาในโรงพยาบาลรวมทั้งเก็บข้อมูลพื้นฐานผู้ป่วย อัตราการเสียชีวิต ในโรงพยาบาล ระยะเวลาการรักษาตัวในโรงพยาบาล และอัตราการรักษาทดแทนไต*

ผลการศึกษา: *ผู้ป่วยวิกฤตทั้งหมด 300 คน พบว่ามีภาวะไตวายเฉียบพลันตาม RIFLE criteria 200 คน (66.7%) โดยแบ่งเป็น Risk 12.7% Injury 20.7% และ Failure 33.3% สำหรับการใช้ AKIN criteria พบว่ามีภาวะไตวายเฉียบพลัน 230 คน (76.7%) โดยแบ่งเป็น stage I 16% stage II 13.3% และ stage III 47.3% โดยพบว่าการวินิจฉัยโดย AKIN criteria มีอัตราการเกิดภาวะไตวายเฉียบพลันมากกว่า RIFLE criteria ประมาณ 10% อัตราการเสียชีวิตในโรงพยาบาล 51.7% โดยผู้ป่วยที่มีภาวะไตวายเฉียบพลันมีอัตราการเสียชีวิตมากกว่ากลุ่มที่ไม่มีภาวะไตวายเฉียบพลัน ($p < 0.001$) AKIN criteria มีความสามารถทำนายอัตราการเสียชีวิตได้แม่นยำกว่า RIFLE criteria ($p = 0.003$) อย่างไรก็ตาม ทั้ง AKIN และ RIFLE criteria ยังมีความแม่นยำในการทำนายอัตราการเสียชีวิตต่ำ (AUC-ROC = 0.69, 0.63 ตามลำดับ) เมื่อเทียบกับ APACHE II (AUC-ROC = 0.8), SAPS 3 (AUC-ROC = 0.77) และ SAPS 2 (AUC-ROC = 0.76)*

สรุป: *AKIN criteria มีความไวในการวินิจฉัยภาวะไตวายเฉียบพลันได้ดีกว่า และมีความสามารถในการทำนายอัตราการเสียชีวิตที่ดีกว่า RIFLE criteria อย่างไรก็ตาม APACHE II มีความสามารถทำนายอัตราการเสียชีวิตได้ดีที่สุดในผู้ป่วยวิกฤต*