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DEVELOPMENT AND EFFECTIVENESS OF SCORING SYSTEM FOR HEMODIALYSIS IN RENAL FAILURE

General Medicine

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ABSTRACT

Aim and objectives: To develop a renal failure severity scoring system for deciding on need for urgent dialysis. To assess the efficacy of system in terms of mortality and morbidity.

Material and methods: - This study was conducted in 387 patients admitted in medicine wards N. S. C. B. MCH Jabalpur with diagnosis of altered renal function due to various causes (acute and chronic), over a period of one year (October 2013 to September 2014). A self structured renal failure severity scoring system develop in which included Variables like Age, Sex, Etiology , Acute kidney injury , Chronic kidney disease , Physical signs (Pulmonary edema, Acidotic breathing , Urine output , Signs of uremic encephalopathy), Biochemical parameters (Blood urea ,Serum creatinine , Serum potassium, Serum bicarbonate) and by this scoring system asses the patients who need for urgent dialysis. The data of the present study was recorded into computer and after proper validation, error checking, the data was compiled and analysed using the SPSS Window and it is compared with previous years in same institute when this scoring system was not followed.

Result and conclusion: - It was observed that, during the period of study out of 387 Cases of renal failure, 230 ultimately required dialysis (59.4%). 99 patients expired that included both dialysis and none dialysis. Net mortality was 25.58%.

KEYWORDS

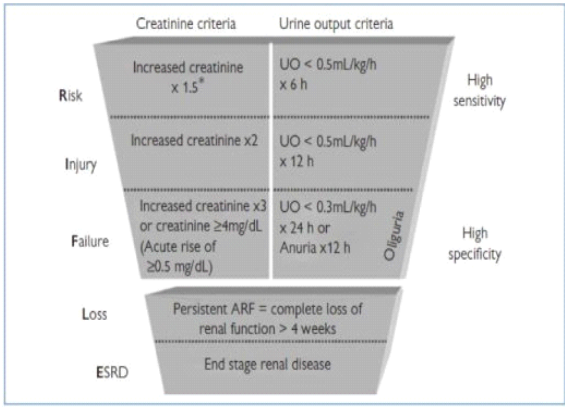
Acute Kidney injury (AKI), Chronic kidney disease (CKD), End stage renal disease (ESRD), Glomerular filtration rate (GFR), Renal replacement therapy (RRT). Hemodialysis (HD)

INTRODUCTION AND LITERATURE SURVEY

Acute kidney injury (AKI)—or acute renal failure (ARF), as it was previously termed—is defined as an abrupt or rapid decline in renal filtration function. This condition is usually marked by a rise in serum creatinine concentration or by azotemia (a rise in blood urea nitrogen [BUN] concentration). [1] However, immediately after a kidney injury, BUN or creatinine levels may be normal, and the only sign of a kidney injury may be decreased urine production.

RIFLE classification system

In 2004, the Acute Dialysis Quality Initiative work group set forth a definition and classification system for acute renal failure, described by the acronym RIFLE (Risk of renal dysfunction, Injury to the kidney, Failure or Loss of kidney function, and End-stage kidney disease). [2,3] Investigators have since applied the RIFLE system to the clinical evaluation of AKI, although it was not originally intended for that purpose. AKI research increasingly uses RIFLE. See below.



Chronic kidney diseases: - CKD is defined as either kidney damage or a decreased glomerular filtration rate (GFR) of less than 60 mL/min/1.73 m^2 for at least 3 months. Whatever the underlying etiology, once the loss of nephrons and reduction of functional renal mass reaches a certain point; the remaining nephrons begin a process of irreversible sclerosis that leads to a progressive decline in the GFR. [4]

Stage	Description	GFR ml/min/1.73 m^2	Evaluation	Management
	At increased risk		Test for CKD	Risk factor management
1	Kidney damage with normal or	> 90	Diagnosis Co morbid conditions CVD and CVD	Specific therapy, based on diagnosis Management of co morbid condition Treatment of CVD and CVD risk factors
2	Kidney damage with mild GFR	60 – 89	Rate of progression	Slowing rate of loss of kidney function
3	Moderate GFR	30 – 59	Complications	Prevention and treatment of complications
4	Severe GFR	15 – 29		Preparation for kidney replacement therapy Referral to Nephrologists
5	ESRD	<15		Kidney replacement therapy

Dialysis Requirement [5]

All the patients with CKD eventually require frequent dialysis once their GFR falls below 15ml/min. In AKI, in order to give time for the natural recovery of the kidney function, dialysis is performed in an attempt to maintain the blood chemistry under acceptable limits. Since the rate of accumulation of waste products in hyper catabolic renal failure (AKI) is rapid, urgent /early dialysis has a major role in giving a favorable outcome. Since the kidneys most often are not irreversibly damaged in AKI, timely dialysis is of utmost significance as far as long-term prognosis is concerned.

Indications For and Timing of Initiation of Dialysis [6]

Accepted indications for renal replacement therapy (RRT) in patients with acute kidney injury (AKI) generally include:

Refractory fluid overload
- Hyperkalemia (plasma potassium concentration >6.5 mEq/L) or rapidly rising potassium levels.
- Signs of uremia, such as pericarditis, neuropathy, or an otherwise unexplained decline in mental status
- Metabolic acidosis (pH less than 7.1)
- Certain alcohol and drug intoxications
- Intractable gastrointestinal symptoms
- In asymptomatic adult patients, a glomerular filtration rate (GFR) of 5-9 mL/min/1.73 m^2, irrespective of the cause of the CKD or the presence of absence of other co morbidities.

The Problem

Till now there is no universal consensus on the question "when to start dialysis in patients with renal failure?" So it is high time we develop a simple & effective scoring system for renal failure patients for deciding on dialysis that can be followed universally. The scoring system shall assess the severity of individual cases quickly and identify who should be taken for dialysis. My study is intended to develop a simple & effective scoring system for these patients that will enable the health care provider to take decision regarding dialysis without confusion.

Aims and objectives

1. To develop a renal failure severity scoring system for deciding on need for urgent dialysis.
2. To assess the efficacy of system in terms of mortality and morbidity.
3. This will be done by comparing the mortality & morbidity rates in previous years retrospectively when the scoring system was not followed.

Material and methods: - This study was conducted in 387 patients admitted in medicine wards N. S. C. B. MCH Jabalpur with diagnosis of altered renal function due to various causes (acute and chronic), over a period of one year (October 2013 to September 2014). A self structured renal failure severity scoring system develop in which included Variables like Age, Sex, Etiology , Acute kidney injury , Chronic kidney disease , Physical signs (Pulmonary edema, Acidotic breathing , Urine output , Signs of uremic encephalopathy), Biochemical parameters (Blood urea ,Serum creatinine , Serum potassium, Serum bicarbonate) and by this scoring system asses the patients who need for urgent dialysis. The data of the present study was recorded into computer and after proper validation, error checking, the data was compiled and analysed using the SPSS Window and it is compared with previous years in same institute when this scoring system was not followed.

Inclusion criteria

All patients with altered Renal function tests admitted in medicine wards.
Age >15years.

Exclusion criteria

Age <15 years.
Patients with intractable heart failure.
HIV/ HBsAg positive cases.
Patients with chronic debilitating illness like extensive PTB etc.

RESULTS:-

In present study total 387 number of patient included in which Maximum number of cases were in the age group 20-29 years (24%) followed by 40-49 & 50-59 (20% each). Least number of cases was seen in the age group 70-79 years (2%). Males constituted the majority of cases (56%). Out of 387 cases males constituted 217 cases & female's 170 cases (44%). ESRD was the most common cause of renal failure that required RRT/ HD among patients in this study. Post gastroenteritis renal failure was the most common cause of ARF that demanded HD in our study (16%). Among the physical signs observed in the study group, oliguria was the most common (56%) followed by pulmonary edema (30%), anuria (14%), Uremic encephalopathy (12%) and acidotic breathing (6%)

Out of 387 patients, 230 (59.4%) patients needed dialysis according to new grading system. Out of 387 cases 70 cases (18.1%) needed only conservative management with biochemical assessment every alternate day according to new grading system. 87 Cases (22.5%) had to be kept under close monitoring with biochemical monitoring every 12 hourly and physical assessment every 4 hours.

DISCUSSIONS:-

AGE DISTRIBUTION:

Maximum number of cases were in the age group 20-29 years (24%) followed by 40-49 & 50-59 (20% each). Least number of cases was seen in the age group 70-79 years (2%). A study by lindeman R D, tobin j et al (1985) have reported that incidence and progression of renal failure to a level that requires RRT increases with age.[7] Similar results have been reported by Eriksun B O et al in their study on progression of kidney disease.[8]

SEX DISTRIBUTION:

Males constituted the majority of cases (56%). Out of 387 cases males constituted 217 cases & female's 170 cases (44%). A study by Iseki et al (1996) has reported that risk of development of renal failure requiring RRT was more in males as compared to females.[9]

ETIOLOGY: ESRD was the most common cause of renal failure that required RRT/ HD among patients in this study. Post gastroenteritis renal failure was the 2nd most common cause of ARF that demanded HD in our study (16%). This was followed by obstetric cause and obstructive uropathy (8% each), snake bite (6%), malaria, sepsis, hepato renal syndrome (2%each). A study by Liano F, pascal j had reported that pre renal azotemia is the most common cause of acute kidney injury and accounts for 40- 55% of all cases.[10]

Development of new renal failure scoring system

Etiology Scoring:

Among the common etiologies, ARF due to snake bite, Acute Gastro Enteritis, poisoning, obstetric complications are associated with rapid downhill course and requires early intervention. Moreover these are completely reversible causes of renal failure and patients can be salvaged with full recovery of renal function. So they are given a high weight age and given a score of 10. Malaria also has rapid worsening of renal dysfunction but usually presents with non oliguric renal failure, so given a score of 8. Renal failure due to hepatorenal syndrome, sepsis, obstructive uropathy, CKD develop over a longer period of time were body gets time to adapt physiologically and hence slower development of azotemia. So they are given a score of[5].

SUMMARY AND CONCLUSIONS

1. ESRD was the most common cause of renal failure that demanded RRT/ hemodialysis in our study (52.7%). Among AKI, post gastroenteritis renal failure was the most common cause (16%).

2. Renal failure requiring hemodialysis was most common in the age group 20-29 years (24%) and least common in 70-79 years age group.

3. Males constituted majority of the cases in our study.

4. New scoring system based on selected clinical, biochemical parameters has been found to be a simple and effective triage system for identifying the patients who require hemodialysis on priority basis and managing others conservatively. Mortality among renal failure patients who were triaged by this new system over a period of one year from October 2013 to September 2014 was found to be 27.13% which was far less when compared to previous years' data when patients were decided for dialysis without using any scoring system. This system will help the primary level health care providers and general practioners on deciding when to take up a patient for hemo dialysis on priority basis over others. This will also help in decreasing the patient burden for dialysis in an already overburdened tertiary health care system in our country.

CONCLUSION:

- There is an urgent need to develop a comprehensive and practically easy scoring system to identify patients with renal failure who require dialysis on urgent basis among others.
- This study has shown a significant reduction in mortality and morbidity among patients triaged using this new scoring system as compared to previous year.

- IN ANY CIRCUMSTANCES, IT IS THE DECISION OF TREATING PHYSICIAN / NEPHROLOGIST REGARDING WHEN TO START HEMODIALYSIS AND WHOM TO BE TAKEN URGENTLY THAT SHOULD BE FOLLOWED EVEN IF THIS SCORING SYSTEM INDICATES DIFFERENT MODE OF MANAGEMENT FOR THE SITUATION.

Figure no1

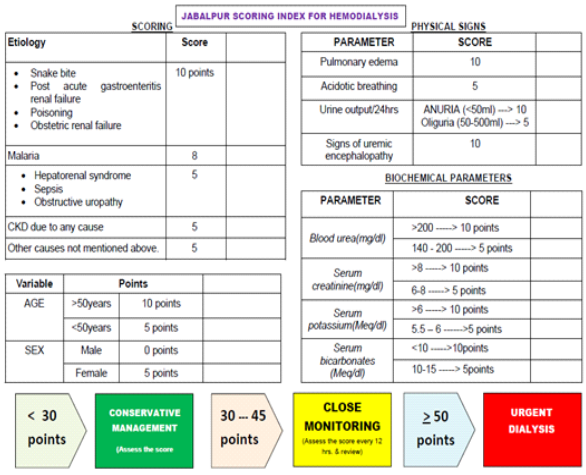


Figure no 2

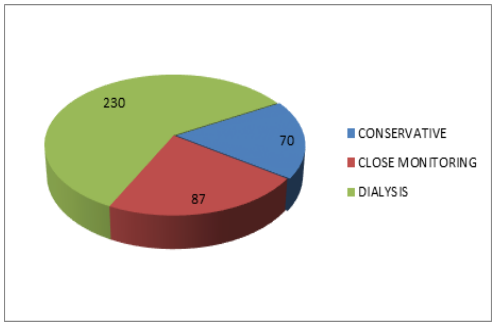


TABLE no.1

Variable	Frequency	%
Age(years)		
15-19	31	8
20-29	93	24
30-39	55	14
40-49	77	20
50-59	77	20
60-69	47	12
70-79	7	2
Gender		
Female	170	44
Male	217	56
Etiology		
Snake bite	23	6
Post AGE	61	16
Poisoning	5	1.3
Obstetrics renal failure	31	8
Malaria	8	2
Hepato renal syndrome	8	2
Sepsis	8	2
Obstructive	31	8
CKD	204(DM105)	52.7
Physical signs		
Pulmonary edema	116	30
Acidotic breathing	23	6
Anuria	54	14
Oliguria	216	56
Uremic encephalopathy	46	12

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