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## Research Article

# The Necessity of Nephrology Consultation for Critically Ill Patients with Acute Renal Failure

### Abstract

**Background:** Acute renal failure (ARF) continues to be a challenging problem in critically ill patients. We reviewed the nephrology consultations in our ICU to assess the necessity of those consultations and if there are any clinical criteria to indicate a necessary consultation.

**Methods:** Retrospective chart review of nephrology consultations for patients with ARF in our medical ICU from 2010 to 2011. After data collection we classified consultations to necessary versus unnecessary based on an experts review. We used chi square and multivariate logistic regression model to compare both groups

**Results:** We found that 45% of patients with ARF admitted to the ICU received nephrology consultation. 32% were identified as unnecessary. Age, gender and etiology were similar in both groups. Oliguria independently predicted the need for nephrology consultation

**Conclusions:** Oliguria predicted the need for nephrology consultation independent of ARF etiology and could be utilized as a clinical guide for the necessity of nephrology consultation.

## Introduction

Acute renal failure (ARF) is a clinical condition in which there is an abrupt deterioration in the kidney functions that develops over hours to days [1]. The exact incidence of ARF in critically ill patients is difficult to assess and it has been reported in different studies anywhere between 1-25% [2]. For example, Uchino et al, investigated the incidence of acute renal failure on an international scale among 29,629 patients from 54 centers in 23 countries. They reported a 5.7% incidence of acute renal injury, out of which 4% required renal replacement therapy (RRT) with approximately 60% hospital mortality [3]. Acute tubular necrosis (ATN) is the most common cause of ARF in ICU. In one prospective study 83% of acute renal failure in ICU were attributed to ATN [4].

Nephrologists are considered an integral contributor to the care of the critically ill patient with ARF. Prior studies addressed the association between early nephrology consultation for patients with ARF and the ICU mortality and length of stay. Balbi et al., showed that critically ill ARF patients evaluated by nephrologists were more seriously ill compared to those not evaluated by nephrologists. The authors concluded that delayed nephrology consultation can be associated with increased ICU mortality, but they couldn't determine whether their results reflected specific benefits to the patients following early nephrology consultations or an adverse effect due to delayed recognition of ARF in the patients who received late nephrology consultations [5]. Another study by Chertow et al., concluded that delayed nephrology consultation in critically ill ARF was associated with increased mortality and morbidity, whether or not dialysis was ultimately required. However they were unable to determine whether their findings reflected residual confounding, selection bias, adverse

effects of delayed recognition of acute renal failure, or actual benefits of nephrology consultation [6].

Some experts feel that the nephrology consultation for ARF in the ICU is being over utilized with a growing tendency to obtain consultation without a clear indication. If this is true, this would increase the burden on an already short supply of nephrologists and add to the cost of patient care [7].

## Objectives

The objective of our study is to examine the necessity of requesting nephrology consultations in ICU patients with ARF. We plan to compare patient characteristics associated with consultations deemed necessary and unnecessary based on independent review by a nephrologist and intensivist.

## Methods

We performed a retrospective chart review of all patients (N=171) with ARF that received nephrology consultation services in our medical ICU from June 2010 to June 2011. We collected information on demographics, admission diagnoses and co-morbid conditions, ICU length of stay, and in-hospital mortality rates. Acute renal failure was defined using RIFLE criteria [8,9]. This study was approved by our Institutional Review Board.

For each nephrology consultation we developed summaries that included the timing of consultation after admission, initial nephrology assessment, daily urine output, daily kidney function tests, any intervention performed or recommended by the nephrologist, and any renal imaging obtained. After gathering all the data, each case was reviewed independently with two experts, an intensivist and a nephrologist. Both experts were blinded to patient identity and care

providers, based on the information provided, each expert was asked to answer two main questions: 1. was the nephrology consultation necessary? 2. Did the consultation change management?

Nephrology consultations were categorized as ‘unnecessary’ if our experts were concordant on choosing unnecessary to question 1. If our experts were discordant or concordant on choosing necessary, we categorized the consultations as ‘necessary.’ This scheme of categorization may bias towards misclassification favoring ‘necessary’ consultations, but we feel that this is the most conservative approach based on our study objective.

We performed bivariate analysis using chi square for categorical (or Fisher’s exact when appropriate) and the Student’s t test for continuous variables. Predictors of necessary consultations were examined using multiple logistic regression. All analyses were performed using Stata 10.0 (College Station, TX).

### Results

We found that 45.6 percent (78/171) of patients with ARF admitted to our medical ICU received nephrology consultation. Patients receiving nephrology consultation had an average age of 62.4 (sd 17.1) years and gender was almost equal (53.9% male). New onset ARF occurred in 59 percent (N=46) with the remaining having evidence of background chronic kidney disease. Sepsis was present in 30.8% (N=24) and the majority of ARF was classified as prerenal azotemia (52.6%; N=41). Oliguria was present in 55.1 (N=43) percent.

Following expert review of the clinical information, 32 percent (N=25) of the nephrology consultations were identified as unnecessary and 68 percent (N=53) as necessary. Age, gender, type of renal failure, and contributing causes were similar for unnecessary and necessary consultations, respectively (Table 1). However, oliguria was present in 71.7 percent (N=38) of necessary compared to 20.0 percent (N=5) of unnecessary consultations (p<0.001). Pre-renal azotemia was present in 68 percent (N=17) of unnecessary compared to 45.3 percent (N=24) of necessary consultations, although this did not reach statistical significance (p=0.06). Oliguria was not significantly associated with pre-renal azotemia, sepsis, or ATN in either consultation group and independently predicted the experts’ opinion of the need for nephrology consultation in a multivariate logistic regression model (OR 11.1, 95% CI 3.3 to 37.3).

### Discussion

Most of the previous studies that were designed to assess

the importance of nephrology consultations in ICU have shown tendencies to improve survival with those consultations; however none of those studies determined how many of those consultations were in fact necessary. In our study we didn’t investigate the effects of having nephrology consultations, we rather looked at whether those consultations were requested only when necessary or not. Even though we do appreciate the importance of multidisciplinary care of critically ill patients, we still believe that consultations to other services need to be justified and judicious to avoid overwhelming those services.

We think our study was limited by being of a retrospective design of a single center patient’s population. In spite of that, since our hospital is a tertiary center, we believe that our ICU patients are good representation to ICU patients at the national level. We couldn’t find a statistically significant association between pre-renal azotemia as an etiology of ARF and the necessity of nephrology consultation, and this may have been related to small number of study population rather than an actual lack of association.

We think the importance of our study stems from addressing a challenging concept of nowadays medicine, which is, the need to practice a high quality, evidence based and cost effective practice.

In the future we look forward well-designed prospective studies with higher number of patients to confirm our findings and to explore additional predictors of necessary nephrology consultation.

Acute renal failure was defined using RIFLE criteria.

NB: Sepsis, acute tubular ne Open discussion for business and discussion this conclusion that showed crisis and pre-renal azotemia were not mutually exclusive.

Oliguria was defined as urine output less than 500 ml/24 hrs and/or < 0.5 ml/kg/hour.

OR: odds ratio.

### Conclusion

We found that approximately one third of nephrology consultations for ARF in the medical ICU were considered unnecessary by expert consensus, and the majority of these (80%) had non-oliguric ARF. The cause and type of the acute renal failure was not associated with the necessity of the consultation. However, the presence (or absence) of oliguria predicted our experts’ opinion of the need for nephrology consultation independent of ARF etiology. Pre-renal azotemia was present in over two thirds of unnecessary consultations, but did not reach statistical significance.

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**Table 1:** Baseline characteristics the patients and main outcomes.

	Unnecessary consultations	Necessary consultations	P. value
Age(yrs.)	62.7	62.2	0.90
Gender (male)	48%	56.6%	0.48
Acute renal failure	68%	54.7%	0.27
Acute on chronic renal failure	32%	45.3%	0.27
Sepsis	24%	34%	0.37
Acute tubular necrosis	24%	39.6%	0.18
Pre-renal azotemia	68%	45.3%	0.06
Oliguria	20%	71.7%	<0.001
Total number(percent)	25(32%)	53(68%)	



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