

Letters to the Editor

CLARIFICATION OF KING'S COLLEGE HOSPITAL CRITERIA IN ACETAMINOPHEN-INDUCED FULMINANT HEPATIC FAILURE

To the Editor:

We read with great interest "Failure of the King's College Hospital Criteria to Predict Outcome in a Patient with Acetaminophen Toxicity and Fulminant Hepatic Failure" by Dr. Podnos and colleagues in the September 2001 issue of *Hospital Physician*.¹ We would like to offer some clarifications regarding this case report.

First, we remind clinicians that the King's College Hospital criteria cannot be viewed as a simple checklist as indicated in Table 2 of the case report. In their seminal article defining the King's College Hospital criteria, O'Grady et al concluded the following as prognostic indicators of poor outcome in fulminant hepatic failure: either a pH level less than 7.3 after adequate fluid resuscitation or the combination of prothrombin time greater than 100 seconds, serum creatinine greater than 3.4 mg/dL, and grade III/IV encephalopathy.² In other words, a pH level less than 7.3 after adequate intravenous fluid resuscitation is, by itself, a sufficient prognostic indicator of poor outcome in fulminant hepatic failure. The patient described by Podnos and colleagues had an initial pH level of 6.84, but we would have been interested to know the patient's pH level after initial fluid resuscitation. The patient did, however, fulfill the second criterion with a prothrombin time greater than 100 seconds, serum creatinine level of 3.6 mg/dL, and grade IV encephalopathy.

Second, we acknowledge the complicated nature of this case as evidenced by the patient's late presentation, his initial high acetaminophen level, and early evidence of multiple organ failure as reflected in his laboratory evaluation at admission. The case report states that initial computed tomography studies of the head found no evidence of cerebral edema, and oral *N*-acetylcysteine (NAC) therapy was begun concurrently with supportive care. During the hospital course, the patient developed cerebral edema, and NAC was discontinued. Considering this progression, we would have strongly urged the initiation of intravenous NAC administration, as it has been shown to reduce the incidence of cerebral edema and enhance survival in patients with fulminant hepatic failure when cerebral edema is already present.^{3,4} The United States is one of the few countries which continues to rely almost exclusively on oral administration of NAC. We have no illusions about changing common clinical practice, especially since the Food and Drug Administration has not approved routine intravenous administration of NAC. However, in the setting of cerebral edema and other poor prognostic indicators, only intravenous

NAC has been adequately shown to enhance survival; it is commonly administered in such circumstances in the United States under the guidance of regional poison control centers or local toxicologists.^{5,6}

We concur with the authors' support for expeditious administration of NAC, especially "in the face of dire predictive measures." Considering the few side effects of NAC and the inherently poor histories that often accompany patients with acetaminophen toxicity, we urge physicians to use NAC early in the face of uncertainty and consult their local poison control center for guidance. Furthermore, we concur with the authors that the King's College Hospital criteria "are merely guidelines." In their case report, the authors do not attempt to undermine the usefulness of the King's College Hospital criteria and instead emphasize the need to address each patient on an individual basis.

Jonathan T. Claud, BA

*University of Illinois College of Medicine
Chicago, IL*

Mark B. Mycyk, MD

*Toxikon Consortium
Chicago, IL*

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In reply:

We thank Mr. Claud and Dr. Mycyk for their insightful and appropriate comments regarding our paper, "Failure of the King's College Hospital Criteria to Predict Outcome in a Patient with Acetaminophen Toxicity and Fulminant Hepatic Failure," that appeared in the September 2001 issue of your journal. They raise several important issues on which we would like to comment.

Mr. Claud and Dr. Mycyk are correct in distinguishing

that the King's College Hospital criteria deem a pH level of less than 7.3 after adequate fluid resuscitation as a poor prognostic indicator. Our patient presented with a pH of 6.84 that increased to 7.21 after resuscitation with appropriate fluids. Thus, our patient still fulfilled the first criterion.

At the time that the patient presented to the hospital, our institution did not have a protocol for the intravenous administration of NAC; therefore, oral therapy was used. We discontinued the oral NAC when the patient's family made the decision to withdraw care. The use of intravenous NAC in this setting is considered an "off-label" use. Intravenous administration of NAC is relatively safe, with only hypersensitivity reactions pre-

cluding its widespread use. Since the time that the case patient was treated at our institution, we have implemented a protocol for the intravenous administration of NAC, believing, like Mr. Claud and Dr. Mycyk, that this therapy is more efficacious.

Again, we thank Mr. Claud and Dr. Mycyk for their clarifications and, like them, advocate the early use of intravenous NAC in patients fulfilling the King's College Hospital criteria. We stress, however, that this should be done judiciously and in a multidisciplinary setting.

Yale D. Podnos, MD, MPH

David K. Imagawa, MD, PhD, FACS

*University of California, Irvine Medical Center
Orange, CA*

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