

# The effect of housestaff clustering on the quality of care of patients with cirrhosis

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## A. Study purpose and rationale

Columbia University Medical Center (CUMC) maintains a liver transplant program that has grown into a major regional referral center for patients with liver disease. As part of this program, patients with decompensated hepatic cirrhosis who are admitted to the hospital are cared for by medical housestaff under the direction of the liver transplant team. In the past, these patients have been admitted to any one of several general medical services, and residents would communicate with the liver transplant team via daily progress notes in the patient's chart or in person on an as-needed basis.

In June 2004, in an effort to maximize the educational resources of the liver transplant service and to improve communication between this service and the medical housestaff, the Department of Medicine's residency training program reorganized the residents' coverage of patients on the liver transplant service. Under the revised system, patients with decompensated hepatic cirrhosis are now admitted to a dedicated housestaff team reserved for patients with liver disease. The liver transplant service joins the team on daily rounds to discuss management issues regarding these patients and provides additional weekly didactic sessions to this team.

An informal poll of residents reveals that the revised system has been a major educational boon for the housestaff. Residents feel that daily rounds keep channels of communication open between the liver transplant service and housestaff coverage. Moreover, the high volume of patients with liver disease on this particular service is conducive to advanced teaching in specialized care.

The advantages in education and communication appreciated by residents under this new system may translate into improvements in patient care. This study seeks to determine whether the change to housestaff clustering had an impact on the quality of care for patients admitted to the newly organized liver service.

Retrospective studies have measured the impact of specialized care on outcomes in hepatology. Consultation with a gastroenterology service, as opposed to management by a team of internists without consultation, has been linked to shorter lengths of stay, cost of hospitalization, and decreased 30-day mortality in patients with decompensated cirrhosis admitted to a Veteran Affairs hospital (1). Improved outcomes in alcoholic liver disease have likewise been observed in inpatients followed by gastroenterologists as opposed to those managed by internists alone (2). However, a review of the literature does not reveal any study that measures outcomes in patients with liver disease according to mode of housestaff coverage.

This study will use a surrogate for quality of care, namely the diagnostic paracentesis, in measuring the quality of care of patients with decompensated cirrhosis admitted to the hospital. In such patients, spontaneous bacterial peritonitis is a common cause of decompensation, and the diagnostic paracentesis is essential to diagnose or rule out this life-threatening and treatable disease (3). I hypothesize that housestaff clustering has led to an increased resident familiarity with management of patients with liver disease, and that among those patients who have cirrhosis and ascites, an increasing proportion of these patients who are admitted to the hospital now undergo prompt diagnostic paracentesis.

## B. Study Design and Statistical Analysis

This will be a retrospective cohort study comparing those patients with cirrhosis and possible ascites who are admitted to the hospital before versus after June 17, 2004, when housestaff clustering began. Two outcomes will be determined: the proportion of patients with cirrhosis and possible ascites

who undergo diagnostic paracentesis during their hospitalization, and, among those who undergo this procedure, the number of hours from admission until the diagnostic paracentesis is performed (i.e. the promptness of the procedure).

A chi-squared analysis estimating a difference of 10% between the intervention group and the control group (80% of patients admitted under the system of housestaff clustering undergo a diagnostic paracentesis, as compared to 70% prior to the reorganization) reveals that 313 patients would be required in each group to reveal a significant difference ( $p < 0.05$ ) at 80% power.

An unpaired t-test estimating a difference of six hours between the intervention group and the control group (in measuring the number of hours from admission until diagnostic paracentesis is performed) and using an estimated standard deviation of 12 hours, reveals that 64 patients would be required in each study group to reveal a significant difference ( $p < 0.05$ ) at 80% power.

As a larger number of patients would be required to detect a significant difference for the first comparison, the targeted number of subjects will be 313 patients per study group. Allowing for the exclusion of patients who do not have ascites as determined by imaging and those in whom paracentesis is deferred secondary to comfort care status, the total number of screened admissions will be 425 patients per study group.

As the liver service admits an average of three patients per day, 150 days of admission (i.e. five months) are required to enroll a sufficient number of study patients to achieve statistical significance. However, so as not to overlook a possible seasonal variation in work-up habits (i.e. the control group may gradually undergo an increase in proportion and promptness of paracentesis as the year progresses and experience accrues), a 12 month period will be observed for each group: the study group will comprise admissions between June 17, 2004 and June 16, 2005 while the control group will comprise admissions between June 17, 2003, and June 16, 2004.

Because the control group may demonstrate a "catch up" phenomenon in terms of housestaff care as the year progresses, negating an early difference in quality of care between study and control groups, an interim analysis will be held after the first five months of admission data are accrued. Thus a difference in proportion and promptness of paracentesis, if only present earlier in the academic year, would be appreciated.

### **C. Study procedure**

The study period will span from June 17, 2004 and June 16, 2005 for the study group and will span from June 17, 2003, and June 16, 2004 for the control group. Patients with the diagnosis of cirrhosis indicated by admission ICD-9 code (571.0-571.9) will serve as the initial screening pool (see Figure 1). Of this group, those patients in whom CT scan or abdominal ultrasound during the hospitalization showed no ascites (or trace ascites) will be excluded. Of the remaining group, those patients in whom comfort care is determined on admission (documented DNR or comfort care measures in the patient's chart) will also be excluded. The remaining patients will be considered to have cirrhosis and possible ascites, and will be listed in the denominator.

Baseline characteristics ("table 1") will be noted between the two groups, including age, gender, race, etiology of cirrhosis, primary admitting diagnosis, Child-Pugh score and class, HIV positivity, whether diagnostic imaging of the abdomen (i.e. CT or ultrasound) was performed, and whether the patient is admitted to the intensive care unit during admission.

The determination of whether a patient has undergone diagnostic paracentesis will be made based on the presence of ascitic fluid chemistry results in WebCIS, the clinical information system in which all laboratory results are entered. Patients who have undergone multiple paracenteses throughout admission will not be counted more than once, but a patient who underwent multiple admissions throughout the study period will be counted for each first diagnostic paracentesis of a given hospitalization.

In patients who underwent diagnostic paracentesis, the time at which the ascitic fluid data was logged in WebCIS will be compared to the time at which the patient's first laboratory chemistries (blood

or urinalysis) from the day of admission are logged. The difference in these times will define the time from admission until paracentesis.

**D. Study drugs**

n/a

**E. Medical devices**

n/a

**F. Study questionnaires**

n/a

**G. Study subjects**

The subjects whose charts will be reviewed are patients admitted to Milstein Hospital during the time period delineated above, with the admitting diagnosis of cirrhosis (ICD-9 codes 571.0-571.9).

**H. Recruitment of subjects**

n/a

**I. Confidentiality of study data**

Data will be obtained from the patients' paper charts and electronic medical records, which remain protected by preexisting confidentiality precautions. Collected data will be de-identified so as to maintain the confidentiality of all subjects.

**J. Potential conflict of interest**

There are no conflicts of interest in this study.

**K. Location of the study**

The study population consists of those patients admitted to Milstein Hospital, Columbia University Medical Center.

**L. Potential risks**

n/a

**M. Potential benefits**

Potential benefits to society include a better understanding of the ramifications of housestaff clustering on patient care, both in terms of patients with liver disease, as well as other areas of specialized medical care.

**N. Alternative therapies**

n/a

**O. Compensation to subjects**

n/a

**P. Costs to subjects**

n/a

**Q. Minors as research subjects**

n/a

**R. Radiation or radioactive substances**

n/a

**S. Future implications**

Housestaff clustering was arranged to facilitate communication between residents and the liver transplant team and to improve upon resident education. While these are certainly worthy goals, the overarching goal of system restructuring should be improvement in patient care. If this study, using diagnostic paracentesis as a surrogate for patient care, confirms the hypothesis that patient care is improved due to housestaff clustering, this new system may serve as a model for other centers for the specialized treatment of liver disease. Moreover, other medical subspecialties, including the congestive heart failure service and the ventilator-dependence service, may consider adopting a similar clustering system for the benefit of their respective patients.

**T. References**

- (1) Bini EJ, Weinshel EH, Generoso R, Salman L, Dahr G, Pena-Sing I, Komorowski T. Impact of gastroenterology consultation on the outcomes of patients admitted to the hospital with decompensated cirrhosis. *Hepatology*. 2001;34:1089-95.
- (2) Forrest EH. The impact of specialist management of jaundiced alcoholic liver disease patients. *Scott Med J*. 2004;49:84-7.
- (3) Runyon BA. Management of adult patients with ascites due to cirrhosis. *Hepatology*. 2004;39:841-56.

Figure 1

