Spectrum of Diseases/conditions Exhibiting Hemostatic Abnormalities in Patients Admitted to a Medical Intensive Care Unit of a Tertiary Care Hospital

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Abstract

Background and Aims: In a medical intensive care unit (MICU), many patients develop hemostatic abnormalities, ranging from abnormal clotting tests to frank bleeding. The aim of this study was to assess the etiology of diseases that present with bleeding, its common bleeding manifestations, incidence, MICU stay, mortality, and transfusion requirements in an Indian setup and also to assess if the Acute Physiology and Chronic Health Evaluation II (APACHE II) score can be used as a predictor for blood transfusion requirements. Materials and Methods: Between July 2013 and August 2014, 200 patients with clinically significant bleeding admitted in the MICU were prospectively evaluated. Detailed history, examination, laboratory investigations, APACHE II score, and requirement of blood products were also noted. The endpoints were discharge or death. Results: The spectrum of diseases that presented with bleeding was 47 patients with malaria (23.5%) followed by 36 acute undifferentiated febrile illness (18.0%), 33 dengue (16.5%), 30 leptospirosis (15.0%), 31 acute fulminant hepatitis (15.5%), 14 sepsis (7.0%), and the rest nine miscellaneous causes. The most common bleeding manifestation observed was hematuria in 62/200 (31%). Among the patients studied, 126 expired (63%) and 74 survived (37%). Of the 200 patients, 48/200 (24%) received packed cells, 78/200 (39%) fresh frozen plasma, and 82/200 (41%) platelets. Conclusions: Tropical diseases formed the majority of admissions with bleeding manifestations. Thrombocytopenia is an important marker to predict mortality and also has a significant association with MICU stay. APACHE II score was found to be a good predictor of blood transfusion requirements.

Keywords: Acute Physiology and Chronic Health Evaluation II score, bleeding, intensive care unit, transfusion, tropical diseases

INTRODUCTION

Hemostasis – “hemo” is derived from New Latin which means blood; “stasis” is derived from Greek which means standing still.[1] Three hemostatic systems: Platelets, intact vasculature, and soluble clotting factors, interact effectively to protect humans from clinically significant bleeding. Significant bleeding is rare until two of the three systems malfunction, and then the magnitude of each failure often must be significant.[2] There is a spectrum of diseases or conditions that we come across in a medical intensive care unit (MICU) that present with clinical or laboratory evidence of hemostatic abnormality. A clinician is often stressed when bleeding and coagulation tests are alarmingly on the rise. At times, apprehension may arise from a sense of responsibility for bleeding following procedures or perhaps the fact that hemorrhage is often visible externally.[3]

The information gained from a careful history-taking, physical examination, laboratory confirmation of the hemostatic abnormalities, and finally the correct interpretation of these results help in the accurate diagnosis and treatment of these patients admitted in the MICU. These patients are major consumers of blood products, yet their incidence and cause have not been studied in detail. Although studies regarding the proportion of patients in MICU with bleeding, their etiology and prognosis are reported from the western world,[4] there is a paucity of data from Indian centers. Having met with limited

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research in this field, we undertook this study hoping to gauge the intensity of this problem. Burdened by the ever-growing demand of blood transfusion products, it is necessary to develop means to predict blood transfusion requirements for each individual so as to be well prepared in times of emergency.

The study was aimed to understand the etiology, incidence, MICU stay, mortality, and bleeding manifestations seen in patients admitted with hemostatic abnormalities in the MICU and to study the transfusion requirements in them and also to assess any association between the Acute Physiology and Chronic Health Evaluation (APACHE) II score at admission in patients with bleeding and blood transfusion requirements.

**MATERIALS AND METHODS**

It is a single-center prospective cohort study carried out from July 2013 to August 2014 in the MICU of a tertiary care hospital in Mumbai, after receiving approval from the Institutional Ethics Committee. Consecutive male and female (pregnant and nonpregnant) patients ≥18 years admitted in the MICU, with clinically evident bleeding unexplained by local factors, with one of the following: prothrombin time/ international normalized ratio (PT/INR) ≥1.5 times the control or activated partial thromboplastin time (aPTT) ≥40 s or platelet count <100,000/cumm, were enrolled in the study. The exclusion criteria were patients with a known bleeding and coagulation disorder (based on history), patients with current use of anticoagulants (heparin/warfarin), and patients who denied a formal consent. A total of 200 patients were finally enrolled after a valid consent was taken from the patient or his/her legally accepted representative.

Case record forms were used to note down the name, age, sex, occupation, and days of MICU stay. Detailed history-taking with special emphasis on bleeding manifestations, drug history, and any previous similar episodes of bleeding were noted. Evaluation of pulse rate, respiratory rate, temperature, blood pressure, and evidence of clinically significant bleeding was done. A complete general and systemic examination was carried out. Need for mechanical ventilation, APACHE II score, and Glasgow coma scale was also noted down. Table 1 lists the case definitions for the diseases that were included in the study.

Laboratory investigations included complete blood count, renal function tests, liver function tests, and arterial blood gas analysis, and coagulation tests included were PT/INR, aPTT, bleeding time, and clotting time. In patients who exhibited severe thrombocytopenia (platelet <50,000/cumm), deranged coagulation parameters (INR ≥ 1.5 and aPTT >40 s), and required one of the blood products; d-dimer level, fibrin degradation products level, and fibrinogen level were carried out to evaluate for disseminated intravascular coagulation (DIC). Other radiological and blood investigations were done as per the discretion of the MICU in-charge for arriving at the primary diagnosis.

The patient was regularly followed up with regard to their clinical developments, laboratory parameters, and blood product requirements. Every patient’s treatment was individualized, and they were treated as per the existing practices without disturbing their routine protocol as per the sole discretion of the treating MICU in-charge. The primary endpoint was discharge or death.

**Statistical analysis**

Quantitative data were presented as mean and standard deviation and compared by Student’s t-test. Qualitative data were presented as frequency and percentage and compared by Chi-square test. Efficacy of parameters such as APACHE II score as screening test to predict the transfusion requirements was done using receiver operating characteristics (ROC). *P* < 0.05 was considered statistically significant.

**RESULTS**

There were 1515 admissions in the MICU during the study period, and 200 consecutive and consenting patients were enrolled in the study who presented with clinically evident bleeding. The results are presented in Tables 2-7.

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**Table 1: Case definitions of diseases that were followed in the study for inclusion**

| Diseases /Conditions        | Investigations done/definition used                                                                 |
|-----------------------------|-----------------------------------------------------------------------------------------------------|
| Malaria                     | Peripheral smear positive for *Plasmodium* species (*vivax/falciparum*) or rapid malaria antigen test |
| Dengue                      | Positive dengue IgM antibody test or dengue NS1Ag or dengue PCR                                     |
| Leptospirosis               | Positive *Leptospira* IgM antibody test or *Leptospira* PCR test                                    |
| Snake bite                  | As per history and clinical features                                                                  |
| Acute fulminant hepatitis   | Defined as a severe liver injury, potentially reversible in nature and with onset of hepatic encephalopathy within 8 weeks of the first symptoms in the absence of preexisting liver disease[^9^] |
|                            | Positive IgM antibody test for hepatitis A, hepatitis E and hepatitis C                               |
|                            | In case of hepatitis B, HbsAg-positive status and HBV DNA levels                                     |
| Sepsis                      | Sepsis is defined as a SIRS in the presence of, or as a result of, suspected or proven infection[^10^] |
| Leukemia                    | Bone marrow biopsy and immunophenotyping                                                               |
| Idiopathic thromboticopenic purpura | Bone marrow biopsy normal and raised levels of immature platelet fraction                           |
| AUFI                        | Defined as fever of two weeks or shorter in duration and lack localizable or organ-specific clinical features[^7^] |

PCR: Polymerase chain reaction; IgM: Immunoglobulin; SIRS: Systemic inflammatory response syndrome; HBV: Hepatitis B virus; AUFI: Acute undifferentiated febrile illness; HbsAg: Hepatitis B virus surface antigen
The mean age of patients in our study was 33.7 years (range 18–80 years); this was not found to be concordant to the study done by Chakraverty et al. and Arnold et al. where the mean age was 56.5 and 6.3 years, respectively.[4,8] Tropical diseases dominated the index study as shown in Table 4. The Indian subcontinent has a heavy monsoon which makes it prone for tropical diseases to flourish. Overcrowding, poverty, illiteracy, and ignorance often lead to a greater spread and prevent the masses from seeking early treatment at the initiation of the symptoms. Due to a delay in transfer to our tertiary care center, most of them presented with complications of the disease. Table 8 shows a comparison between our study and the studies of Chakraverty et al. and Arnold et al. with respect to the spectrum of diseases that presented with the hemostatic abnormalities in the MICU.[4,8]

The bleeding time was ≤6 min in 95.5% of patients and ≤10 min in 97.5% of the patients. Bleeding time testing has largely been abandoned in the MICU because it is difficult to perform, labor-intensive, and a poor predictor of bleeding in the clinical setting.[3] The clotting time was ≤10 min in 195/200 patients and >10 min in 5/200.

Conventionally, thrombocytopenia has been defined as a platelet count of <150,000/cumm, but in critically ill patients, a threshold of <100,000/cumm has been suggested,[9] due to the relatively high incidence and lack of significant bleeding with counts between 100,000/cumm and 150,000/cumm.[2] Thrombocytopenia is the most common coagulation problem in the MICU, with an incidence of 15%–60% depending on the definition used, population evaluated, and period of MICU stay studied.[10,11] Thrombocytopenia is a common cause of bleeding in the ICU setting. The highest incidence is seen in patients with severe sepsis.[11,12]

In our study, thrombocytopenia was seen in 161/200 (80.5%) patients, of which 121 (63.33%) expired and 59 (36.64%) survived. The P < 0.05 clearly states that thrombocytopenia is an important marker that is predictive of mortality. Severe thrombocytopenia (platelet count <50,000/cumm) was seen in 111/161 patients (68.94%), of which 41 (36.9%) survived and 70 (63.1%) expired. Severe thrombocytopenia was most commonly found in malaria followed by acute undifferentiated febrile illness (AUFi). In the study by Chakraverty et al., thrombocytopenia (platelet <100,000/cumm) was identified in 38% of the patients whereas severe thrombocytopenia (platelet <50,000/cumm) was observed in 12.5% of the patients. The most common causes of

### Table 2: Demographic and clinical parameters of 200 patients admitted in medical intensive care unit with clinically significant bleeding

| Parameters                      | Values       |
|---------------------------------|--------------|
| Age (years)+SD                  | 33.7±14.809  |
| Sex: Male (n)                   | 122          |
| Female, n (%)                   | 78           |
| Pregnant                        | 17 (21.9)    |
| Postpartum                      | 12 (15.38)   |
| Nonpregnant                     | 49 (62.82)   |
| Highest MICU stay (days)        | 8            |
| Mechanical ventilation: Yes/no (n) | 107/93      |
| Clinical examination findings, Mean±SD |            |
| Heart rate                      | 102.4±15.01  |
| Respiratory rate                | 29.37±9.54   |
| Systolic BP (mmHg)              | 104.15±24.72 |
| Diastolic BP (mmHg)             | 66.9±13.42   |
| Mean arterial pressure          | 76.12±17.29  |
| GCS                             | 13.44±2.37   |
| APACHE II score                 | 13.09±7.19   |
| Survivors/expired, n (%)        | 74 (37)/126 (63) |

BP: Blood pressure; GCS: Glasgow coma scale; MICU: Medical intensive care unit; SD: Standard deviation

### Table 3: Laboratory parameters of 200 patients admitted in the medical intensive care unit with clinically significant bleeding

| Parameters         | Mean ± SD       |
|--------------------|-----------------|
| Hemoglobin (g %)   | 9.90±2.52       |
| Hematocrit (%)     | 28.49±8.16      |
| White blood count (cumm) | 12800.9±9089.52 |
| Platelet (cumm)    | 74357.5±80314.9 |
| PT (s)             | 22.4±9.36       |
| INR                | 2.39±3.71       |
| aPTT (s)           | 39.58±11.30     |
| Bleeding time (min)| 3.47±1.20       |
| Clotting time (min)| 6.46±1.56       |
| Creatinine (mg/dl) | 2.51±2.12       |

aPTT: Activated partial thromboplastin time; INR: International normalized ratio; SD: Standard deviation; PT: Prothrombin time

### Discussion

Bleeding in the MICU is perceived to be an important problem, yet few studies have addressed its clinical impact. Patients with clinically evident bleeding formed 13.2% of the admissions, i.e., 200/1515. Our results were concordant to the study done by Chakraverty et al. at Oxford–Radcliffe Hospital wherein consecutive admissions were studied to determine the incidence and cause of coagulation disturbances. There were 235 admissions in the ICU over a period of 6 months; 148 male (62.97%) and 87 female (37.03%) patients were enrolled. Of the 235 patients who were studied, 32 patients (13.2%) were identified as having a clinical coagulopathy defined as bleeding unexplained by local/surgical factors.[4]
Table 4: Spectrum of diseases presenting with hemostatic abnormalities and their requirement of blood transfusion products in patients admitted in the medical intensive care unit

| Patients groups (n=200) | Total patients affected | Outcome | Requirement of blood transfusion |
|-------------------------|-------------------------|---------|----------------------------------|
|                         |                         | Expired, n (%) | Survived, n (%) | Packed cells (n) | FFP (n) | Platelet (n) |
| Acute fulminant hepatitis | 31                      | 16 (51.60) | 15 (48.40) | 11 | 30 | 3 |
| Dengue                  | 33                      | 17 (51.50) | 16 (48.50) | 3 | 5 | 17 |
| HELLP syndrome          | 3                       | 2 (66.70)  | 1 (33.30)  | 3 | 3 | 3 |
| ITP                     | 1                       | 0          | 1 (100)    | 0 | 1 | 1 |
| Leptospirosis           | 30                      | 21 (70)    | 9 (30)     | 7 | 8 | 11 |
| Malignancy              | 2                       | 2 (100)    | 0 (0)      | 1 | 0 | 0 |
| Malaria                 | 47                      | 30 (55.32) | 17 (44.8)  | 14 | 13 | 24 |
| Sepsis                  | 14                      | 12 (85.70) | 2 (14.30)  | 5 | 8 | 7 |
| Snake bite              | 3                       | 1 (33.33)  | 2 (66.66)  | 1 | 1 | 0 |
| AUFI                    | 36                      | 25 (69.40) | 11 (30.60) | 3 | 9 | 16 |
| Total/percentage overall| 200                     | 126 (63.00)| 74 (37.00) | 48/24 | 78/39 | 82/41.0 |

AUFI: Acute undifferentiated febrile illness; ITP: Idiopathic thrombocytopenic purpura; HELLP: Hemolysis; elevated liver enzymes levels; low platelet count levels; FFP: Fresh frozen plasma

Table 5: Outcome of patients presenting with thrombocytopenia (platelet <100,000/cumm) on the day of admission

| Thrombocytopenia (n=161) | Outcome | Expired | Survivors |
|--------------------------|---------|---------|-----------|
|                         |         |         |           |
| Acute fulminant hepatitis|         | 8       | 1         |
| Dengue                   |         | 17      | 12        |
| HELLP syndrome           |         | 1       | 1         |
| ITP                      |         | 0       | 1         |
| Leptospirosis            |         | 18      | 10        |
| Malignancy               |         | 2       | 0         |
| Malaria                  |         | 25      | 20        |
| Sepsis                   |         | 5       | 4         |
| Snake bite               |         | 1       | 1         |
| AUFI                     |         | 25      | 9         |
| Total                    |         | 102     | 59        |

P<0.05. AUFI: Acute undifferentiated febrile illness; ITP: Idiopathic thrombocytopenic purpura; HELLP: Hemolysis; elevated liver enzymes levels; low platelet count levels

thrombocytopenia included DIC and dilution following blood transfusion. In 54% of the patients, the cause of thrombocytopenia was not identified. The mortality rate of patients who developed thrombocytopenia was significantly higher than in those who did not (32/85 vs. 27/139, P < 0.005). [4]

Baughman et al. showed that thrombocytopenia was associated with longer hospital stay (P < 0.001) and higher mortality (P < 0.001). [13] Analysis of association between platelet count, aPTT, PT/INR, and mean MICU stay was done using tests of significance; it showed that there is a significant association between thrombocytopenia and mean MICU stay (P < 0.05) as shown in Table 9. The highest mean duration of stay was seen in patients of sepsis, i.e., 8 days.

A prolonged global coagulation time – such as the PT or the aPTT – occurs in 14%–28% of intensive care patients. [8,14] In our study, 94 patients (47%) had an INR value ≥1.5–1.9 followed by 62 patients (31%) with an INR <1.5 and then 44 patients (22%) with an INR ≥2. Of 31 patients, 22 (71%) patients with acute fulminant hepatitis had an INR ≥2. Of 47 patients of malaria, 29 (61.70%) had an INR ≥1.5. In the study by Chakraverty et al., the PT ratio was >1.5 in 66.0% and >2 in 29.1%. The most common causes of prolongation of PT were DIC in 12%, liver failure in 10%, and massive transfusion in 10%. The cause of an elevated PT was not identified in 44%. [16]

In our study, 106 patients (53%) were observed to have an aPTT ≤40 s, followed by 84 patients (42%) with an aPTT >40–59 s and 10 patients (5%) with an aPTT >60 s. In patients of acute fulminant hepatitis, 28/31 (90.32%) had an aPTT >40 s. Severity analysis of patients admitted with hemostatic abnormalities in terms of deranged INR, aPTT, platelet count <50,000/cumm, and requirement of one of the blood products was done. There were 24 such patients who were admitted, of which 14 (58.3%) expired and 10 (41.7%) survived. Patients diagnosed with malaria (n= 8) formed the majority, of which five expired and three survived. There was a strong suspicion of DIC in the above group; hence, d-dimer levels, fibrinogen degradation products, and fibrinogen levels were only done in this group. Of 24 patients, 5 (2.5%) patients were confirmed to have developed DIC. Among the five patients, one died of dengue and the other with leptocephosis. The three survivors were diagnosed with HELLP Syndrome pneumonia with sepsis, and AUFI, respectively. DIC is far less common, occurring is an estimated 1% of hospitalized patients, [15] but it may occur in up to 50% of patients with severe sepsis. [16]

Of the patients studied, 107 (53.5%) required mechanical ventilation. There were 85 patients (42.5%) who developed acute respiratory distress syndrome (ARDS), of which 66 patients required mechanical ventilation and 19 patients were on noninvasive ventilation. Global disturbances of key homeostatic systems as in multiple organ system failure have also been associated with a higher incidence of
Patients diagnosed with malaria formed the highest number of cases in our study, i.e., 47/200 (23.5%), with predominantly young males affected. The factors responsible for the age pattern include outdoor work for young adult males and outdoor sleeping habits which make them more prone to mosquito bites. There were 12 patients with mixed malaria (25.53%), 15 with Plasmodium falciparum malaria (31.91%), and 20 patients with Plasmodium vivax malaria (42.55%) in the MICU. The highest mortality was seen in patients with P. vivax 13/30 patients (43.33%). The common bleeding manifestations were hemoptysis (27.65%). Thrombocytopenia (platelet <100,000/cumm) was seen in 45/47 (95.74%). Severe thrombocytopenia (platelet <50,000/cumm) was seen in 33/47 patients, i.e., 70.21% of all patients, of which 19 died (57.57%) and 14 (42.42%) survived. A deranged INR (≥1.5) was observed in 61.7% and a deranged aPTT (≥40 s) was observed in 38.3% of all malaria patients. In patients with P. falciparum, INR (≥1.5) was seen in 11/15 patients, i.e., 73.33%, and an aPTT (≥40 s) was seen in 9/15 patients, i.e., 60%. These findings are concordant with a study by Misra et al., where prolonged aPTT (67%) was seen in patients with P. falciparum. ARDS was seen in 26/47 patients of malaria who were admitted to the MICU with bleeding manifestations, i.e., 55.31%, in concordance with Gupta et al., where the prevalence of ARDS due to malaria was 21.4%. The highest mortality was in P. vivax 10/15 patients (38.46%); these results are in concordance to the study by Limaye et al. where mortality due to ARDS was more in patients with P. vivax malaria.

Of the 200 patients, 33 were diagnosed with dengue in whom gastrointestinal bleeding was predominant, i.e., 17/33, followed by petechiae (10 patients) and hematuria (8 patients). In our study, of 31 patients (15.5%) of acute fulminant hepatitis, 21 were females, of which 12 patients (57.14%) belonged to the obstetric group (pregnant and postpartum). Hematuria was the most common bleeding manifestation in patients with hepatitis. The major cause of fulminant hepatic failure was found to be hepatitis E (48.3%), i.e. 15/31 patients, the others being hepatitis A, hepatitis B, and rat kill poisoning, and in eight patients, the cause was undetermined. This is supported by the fact that hepatitis A and E are common causes of hepatic encephalopathy in developing countries as observed in studies by Acharya et al.

In our study, sepsis formed 7% of the admissions that presented with bleeding manifestations. The mortality in these patients was 85.70%. Thrombocytopenia was seen in 64.28%. Similar findings were seen in the study by Brun-Buisson et al., where sepsis is a clear risk factor for thrombocytopenia, with an estimated incidence of 35%–59%. AUFI patients formed 18% of our admissions. There were three patients of snake bite who were admitted; hematuria was observed in the patient who succumbed. One of the survivors had epistaxis and the other one had hematemesis and local bleeding. There were two patients with malignancy. The first patient was a case
of chronic myeloid leukemia who presented with hematuria, gastrointestinal bleeding, and epistaxis. The second patient was a case of acute myeloid leukemia-M4 who presented hematuria.

Of the study population, 48 patients (24%) received packed cells, 78 patients (39%) received fresh frozen plasma (FFP), and 82 patients (41%) received platelets. Hematuria was the most common bleeding manifestation seen in 62 patients and 39 of them required FFP (62.90%). Platelet requirement was the highest in those with bleeding per vaginum/menorrhagia (57.10%) followed by 51.85% of patients with epistaxis. The indications for transfusion were hemorrhage, low platelet counts, prolonged PT or to provide cover for invasive intervention. Our results are consistent with the study done by Lauzier et al., where the FFP transfusion requirement in critically ill patients was 29.9%.[24] Patients with acute fulminant hepatitis were observed to require more number of packed cells transfusion (35.5%) and FFP transfusion in comparison to the other patients who were admitted. Platelet requirement was similar in patients with malaria and dengue (51%).

In a study by Rao et al., where blood component use in critically ill patients was studied, 53% patients were administered red cells, 16% were administered platelets, and 22% of the patients were transfused FFP.[25]

In our study, APACHE II score was found to be a good predictor of blood transfusion requirements as interpreted by the ROC curves (area under the curve = 0.63, \( P < 0.05 \)) and was statistically significant as shown in Table 10 and Figure 1.

The overall MICU mortality was 37.95% (574/1515). Out of 200 patients who were admitted with bleeding manifestations, 126 expired (63%) and 74 (37%) survived. In a study by Chakraverty et al., the overall MICU mortality was 27.2%, i.e., 64/235 patients died, and of the 32 patients who had clinically evident bleeding 13 patients expired.[4]

**Conclusions**

Our study shows that a significant number of patients present with hemostatic abnormalities in the MICU with predominantly tropical diseases such as malaria, dengue, and leptospirosis. A high APACHE II score predicts a higher blood transfusion requirement. Thrombocytopenia is an important marker to predict mortality and also has a significant association with MICU stay. Management of bleeding and coagulopathies in the MICU should be directed at treating the underlying condition and avoiding the correction of laboratory abnormalities with blood products unless there is a clinical bleeding problem.

### Table 8: Below is the graphical representation of patients with various diseases in whom hemostatic abnormalities were studied in the medical intensive care unit

| Chakraverty et al. | Arnold et al. | Our study |
|-------------------|--------------|-----------|
| Cardiovascular    | 34%          | 15%       | 0%        |
| Gastrointestinal  | 17%          | 28%       | 0%        |
| Trauma            | 12%          | 0%        | 0%        |
| Respiratory       | 9%           | 19%       | 0%        |
| Neurological      | 7%           | 4%        | 0%        |
| Hepatic           | 3%           | 0%        | 15.5%     |
| Oncology          | 3%           | 0%        | 1%        |
| Renal             | 2%           | 6%        | 0%        |
| Obstetric         | 2%           | 0%        | 1.5%      |
| Hematologic       | 0%           | 1%        | 0.5%      |
| Sepsis            | 0%           | 13%       | 7%        |
| Metabolic         | 0%           | 8%        | 0%        |
| Urological        | 2%           | 0%        | 23.5%     |
| Malaria           | 0%           | 0%        | 18%       |
| AUFI              | 0%           | 0%        | 16.5%     |
| Dengue            | 0%           | 0%        | 15%       |
| Leptospirosis     | 0%           | 0%        | 15%       |
| Snake bite        | 0%           | 0%        | 1.5%      |
| Miscellaneous     | 10%          | 6%        | 0%        |

Our study has been compared to the study by Chakraverty et al.[4] and Arnold et al.[8] AUFI: Acute undifferentiated febrile illness

### Table 9: Demonstration of mean medical intensive care unit stay with deranged laboratory parameters mentioned below

| Variable                          | \( n \)  | Mean MICU stay±SD (Days) | \( P \)     |
|-----------------------------------|---------|--------------------------|------------|
| Platelet <100,000/cumm            |         |                          |            |
| No                                | 39      | 4.97±4.6                 | <0.05      |
| Yes                               | 161     | 3.53±3.1                 |            |
| Deranged PT/INR (≥1.5)            |         |                          |            |
| No                                | 138     | 4.04±3.6                 | 0.17       |
| Yes                               | 62      | 3.31±3.17                |            |
| Deranged aPTT (≥40)               |         |                          |            |
| Yes                               | 94      | 4±3.6                    | 0.47       |
| No                                | 106     | 3.64±3.4                 |            |

MICU: Medical intensive care unit; SD: Standard deviation; PT: Prothrombin time; INR: International normalized ratio; aPTT: Activated partial thromboplastin time

**Figure 1:** Receiver operating characteristic curve demonstrating the relationship between acute Physiology and Chronic Health Evaluation II score and requirement of blood products for transfusion
surgical procedure is required, or both. Clinically evident bleeding in patients requires prompt diagnosis, intensive monitoring, and early therapeutic intervention. We would like to draw attention to the need for further studies in the Indian setup that focuses on diseases that are prevalent here that present with bleeding and coagulopathy so as to be able to frame rational transfusion policies that would guide management of bleeding and coagulopathies in the MICU.

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### Conflicts of interest
There are no conflicts of interest.

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| Table 10: Demonstration of relationship between Acute Physiology and Chronic Health Evaluation II score and requirement of blood products for transfusion |
|-----------------------------------------------|
| **AUC** | **SE** | **Asymptotic significant** | **Lower bound** | **Upper bound** |
| AUC: Area under the curve; CI: Confidence interval; SE: Standard error; APACHE: Acute Physiology and Chronic Health Evaluation | 0.63 | <0.05 | 0.526 | 0.684 |