



## Course of hospitalization of patients referred on an emergency basis due to bleeding into the gastrointestinal tract.

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## ABSTRACT

**INTRODUCTION:** Bleeding into the gastrointestinal tract in the prehospital setting is often a cause of a life-threatening condition. The vast majority of cases (80%) involve bleeding from the upper gastrointestinal tract and the mortality reaches even 14% of cases. It is then necessary to quickly diagnose and direct the patient for hospitalisation as the most effective treatment in the endoscopic therapy. The study aimed to analyse the profile of the patient referred to a hospital by a primary healthcare physician with suspicion and/or diagnosis of bleeding from the gastrointestinal tract.

**MATERIAL AND METHODS:** The authors attempted to assess the initial laboratory results of critical parameters (RBC, HGB, HCT and PLT) of patients admitted on an emergency basis in 2017-2020 to the municipal hospital in Siedlce, Poland. The total number of patients with bleeding symptoms referred by a primary healthcare physician was 843. The inclusion procedure included patients referred on an emergency basis only (n=56). The statistical analysis was conducted by means of the Shapiro–Wilk test of normal distribution, Spearman's rho correlation and Chi-Square Tests of Independence. All results were regarded as significant at  $p < 0.05$ .

**RESULTS:** The study included 32 males and 24 females referred in 60.71% of cases with the ICD-10 diagnosis of K92.2. The mean age of the patients was 65.02 years ( $SD \pm 14.69$ ). The mean hospitalisation time was 5.11 days ( $SD \pm 12.14$ ), both in males and females. The average blood test results in males were as follows: RBC:  $3.28 \cdot 10^6/\mu\text{L}$ ; HGB: 9.26 g/dL; HCT: 27.94%; PLT:  $229.13 \cdot 10^3/\mu\text{L}$ , while in females: RBC:  $3.26 \cdot 10^6/\mu\text{L}$ ; HGB: 9.76 g/dL; HCT: 29.12%; PLT:  $240.33 \cdot 10^3/\mu\text{L}$ . Therapy with packed red blood cells was significantly dependent on the level of RBC ( $p=0.000$ ), HGB ( $p=0.001$ ) and HCT ( $p=0.000$ ). However, it was not dependent on PLT ( $p=0.141$ ). A similar tendency was shown in the correlation of plasma therapy with critical values of selected laboratory tests (RBC:  $p=0.000$ ; HGB:  $p=0.021$ ; HCT:  $p=0.005$ ; PLT:  $p=0.116$ ).

**CONCLUSIONS:** The hospitalisation of patients from the study group concerned mostly to older males, whose laboratory test results were usually much below the normal limits. Patients referred to hospital on an emergency basis usually warrant therapy related to deep anaemia. Despite a high survival rate, educational programmes aiming at early diagnosis of symptoms and implementation of diagnostics for bleeding from the gastrointestinal tract are to be considered.

**KEY WORDS:** Gastrointestinal bleeding, hospital, blood count, admittance.

## INTRODUCTION

Blood loss into the lumen of the gastrointestinal tract may have a diverse course: from latent to abrupt episodes of haemorrhage. Both acute bleedings and persistent ailments can pose threat to the life and health of a patient. The occurrence of disconcerting symptoms requires a quick diagnosis, mostly by means of endoscopic diagnostics. Bleeding from the upper gastrointestinal tract (upper GI tract) and the lower gastrointestinal tract (lower GI tract) are distinguished. In gastroenterology, bleeding from the upper GI tract occurs in the vast majority of medical emergencies. It is estimated that ca. 25% of patients is above the age of 80 and the number of deaths grows as the occurrence of concomitant diseases grows [1]. The diagnosis and treatment of bleedings from the lower GI tract are usually more difficult due to a more awkwardly located source of bleeding. In the United Kingdom, bleeding from the lower gastrointestinal tract accounts for 3% of all urgent admissions to surgical departments [2]. Some of the symptoms are so non-specific that patients get medical attention late. The role of the primary healthcare physician is to, among others, assess the general condition, refer a patient for further diagnostics on an elective basis and treatment and – if there is a need for quicker intervention – refer the patient straight to hospital. In special cases, a physician considers referring a patient on an emergency basis or calling an ambulance directly to the medical centre or the place where the patient is waiting under medical supervision. The decision to leave a patient at home or issue a referral for elective admission to hospital should be made only if the physician does not identify direct threat to the patient's life and does not expect that the bleeding will come back.

The study aimed to analyse the course of hospitalisation of the patients with bleeding into the gastrointestinal tract referred to hospital on an emergency basis by primary healthcare physicians as well as to try to define the profile of the patient with bleeding on the basis of critical blood count parameters.

## MATERIAL AND METHODS

The analysis included patients treated in the period from 2017 to 2020. The total number of patients with bleeding symptoms referred by primary healthcare physicians was 843. The study group included 56 patients referred by a primary healthcare physician on an emergency basis to the general surgery department of the Autonomous Public Healthcare Centre in Siedlce. Their laboratory test results were analysed: the number of erythrocytes (RBC), the level of haemoglobin (HGB), the level of haematocrit (HCT) and the number of blood platelets (PLT).

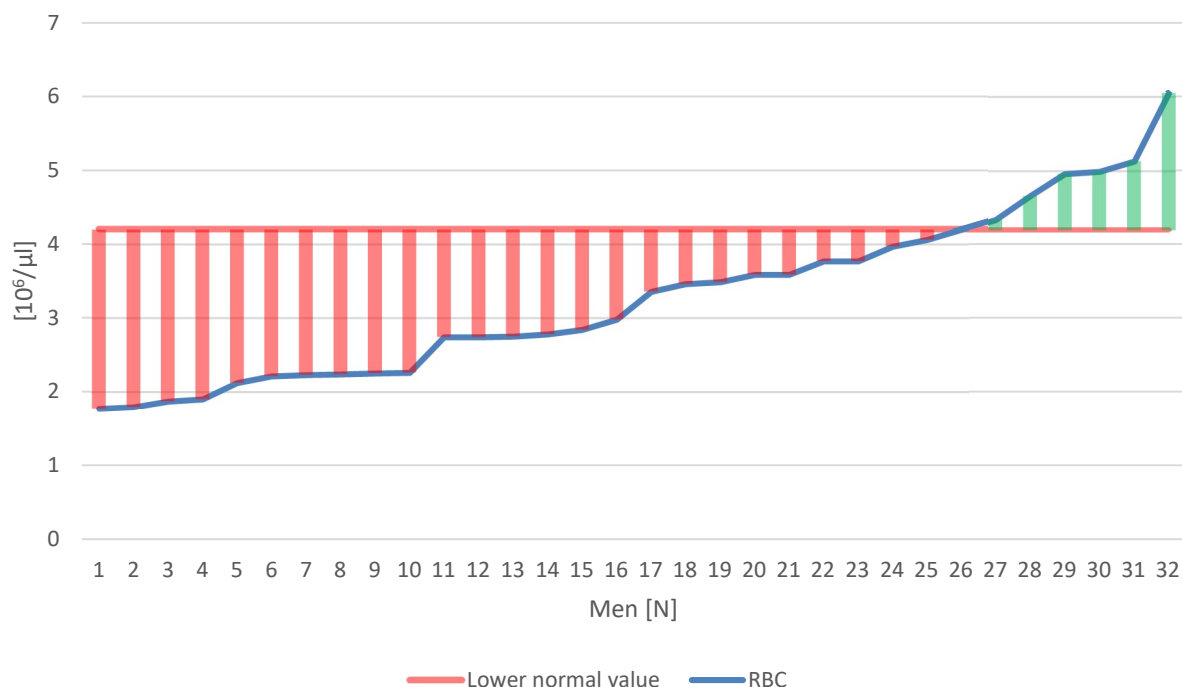
A retrospective study was conducted on the basis of the medical medication kept in the Autonomous Public Healthcare Centre in Siedlce in central Poland. The normal limits for tests were assumed on the basis of laboratory criteria effective during the tests [3]. The study was given a positive opinion by the ethics committee of the Siedlce University of Natural Sciences and Humanities (no. 3/2021 of 7 January 2021). The statistical analysis was conducted by means of the Shapiro–Wilk test of normal distribution, Spearman's rho correlation and Chi-Square Tests of Independence performed in the PAST 3.20 software. All results were regarded as significant at  $p < 0.05$ .

## RESULTS

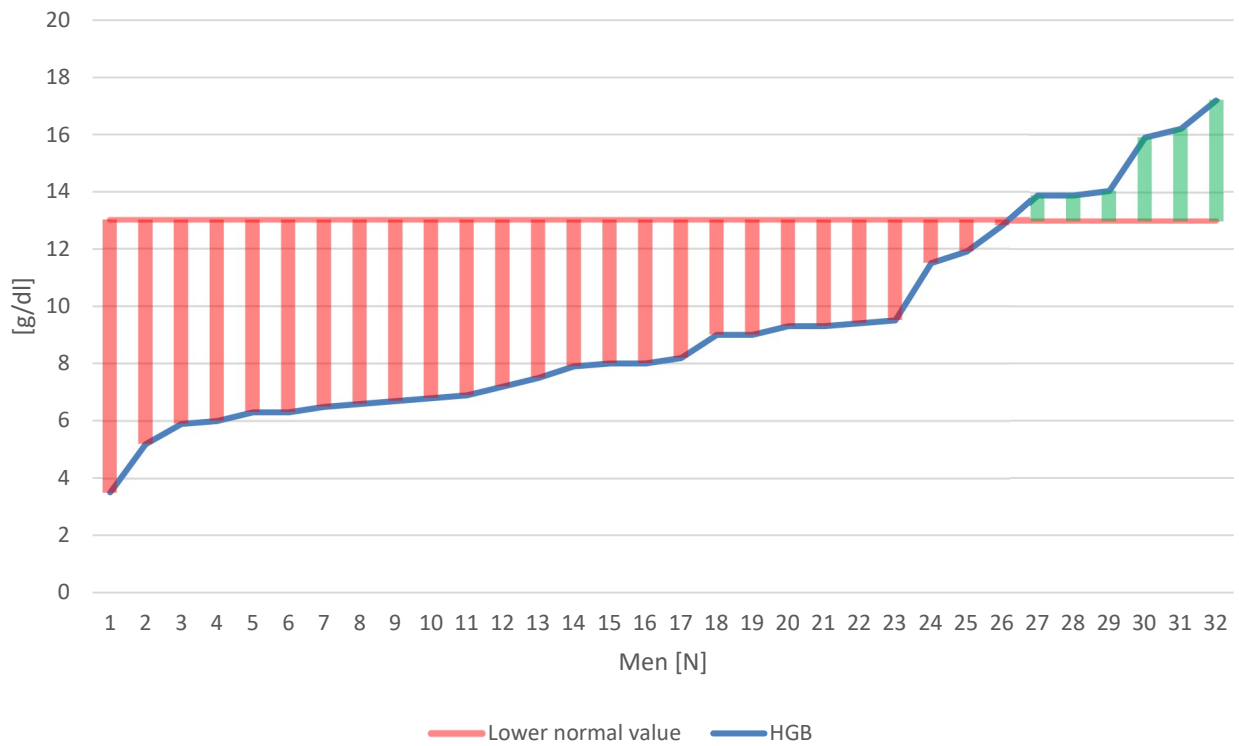
The 56 patients included 32 males and 24 females. The mean age of the patients was 65.02 years (SD=14.69). The mean hospitalisation time was 5.11 days (SD=12.14), both in males and females. The most frequent (n=34) diagnosis, according to international classification of diseases ICD-10, was gastrointestinal haemorrhage, unspecified (K92.2). The second diagnosis in the study group was other unspecified gastritis (K29.1) (n=4) and diverticular disease of large intestine without perforation or abscess (K57.3) (n=4). Another (n=3) diagnosis was acute haemorrhagic gastritis (K29.0). On admission to hospital, each patient was subject to a standard of treatment according to the Polish Society of Gastroenterology.

### Analysis of selected laboratory test results among males

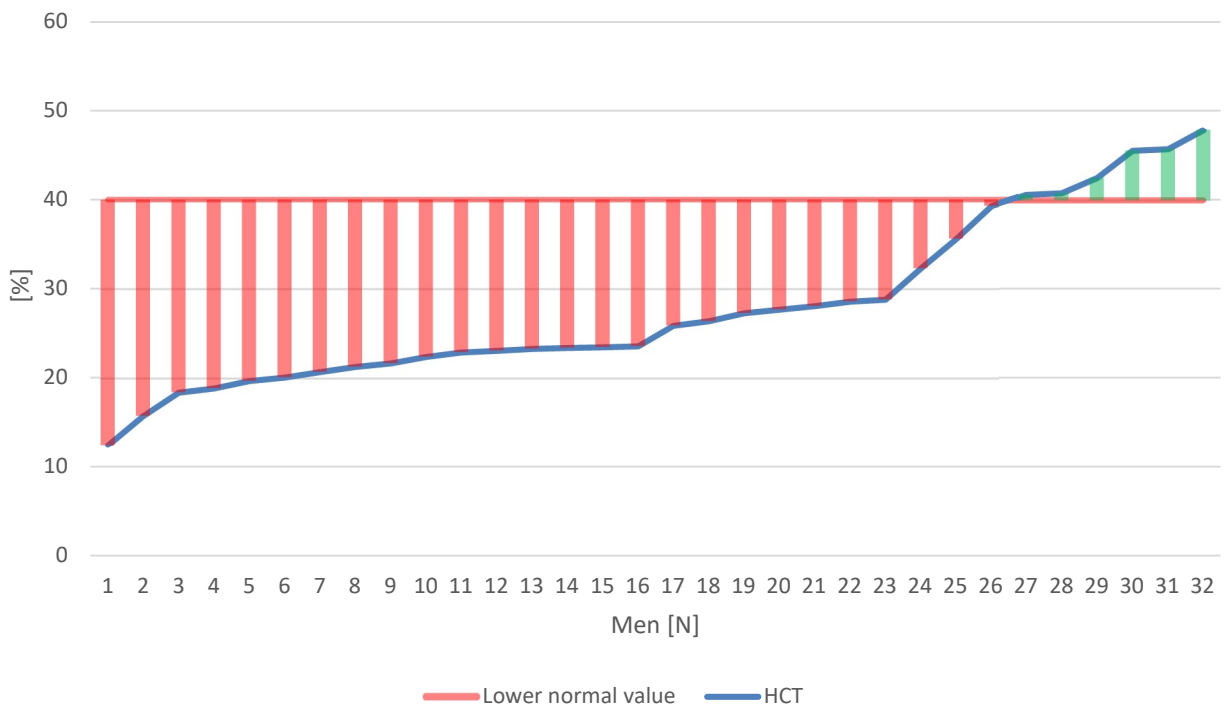
The mean number of erythrocytes in males was  $3.28 \times 10^6/\mu\text{L}$  (SD=1.11). The number of results below normal limits was 25, which accounted for 78.13% of all males. The lowest value was  $1.77 \times 10^6/\mu\text{L}$  and the highest  $6.05 \times 10^6/\mu\text{L}$  (Fig. 1). The mean value of haemoglobin was 9.26 g/dL (SD=3.45). The number of patients with results below normal limits was 26, which accounted for 81.25% of all males. The lowest value was 3.5 g/dL and the highest 17.2 g/dL (Fig. 2). The mean level of haematocrit was 27.94% (SD=9.28). The number of results below normal limits was 26, which accounted for 81.25% of all males. The lowest value was 12.5% and the highest 47.8% (Fig. 3). The mean number of blood platelets was  $229.13 \times 10^3/\mu\text{L}$  (SD=107.93). The number of results below normal limits was 7, which accounted for 21.87% of all males. The lowest value was  $39 \times 10^3/\mu\text{L}$  and the highest  $601 \times 10^3/\mu\text{L}$  (Fig. 4).



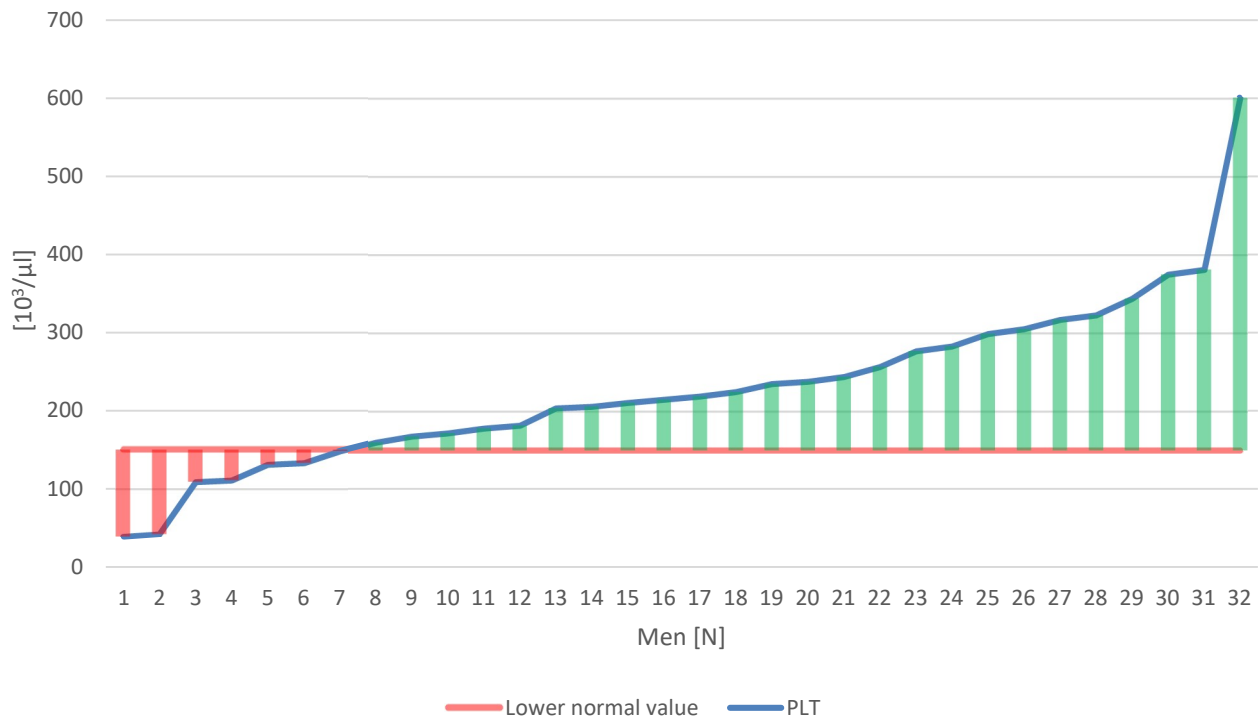
**Figure 1.** Values of erythrocytes depending on the lower end of normal limits among males.



**Figure 2.** Values of haemoglobin depending on the lower end of normal limits among males.



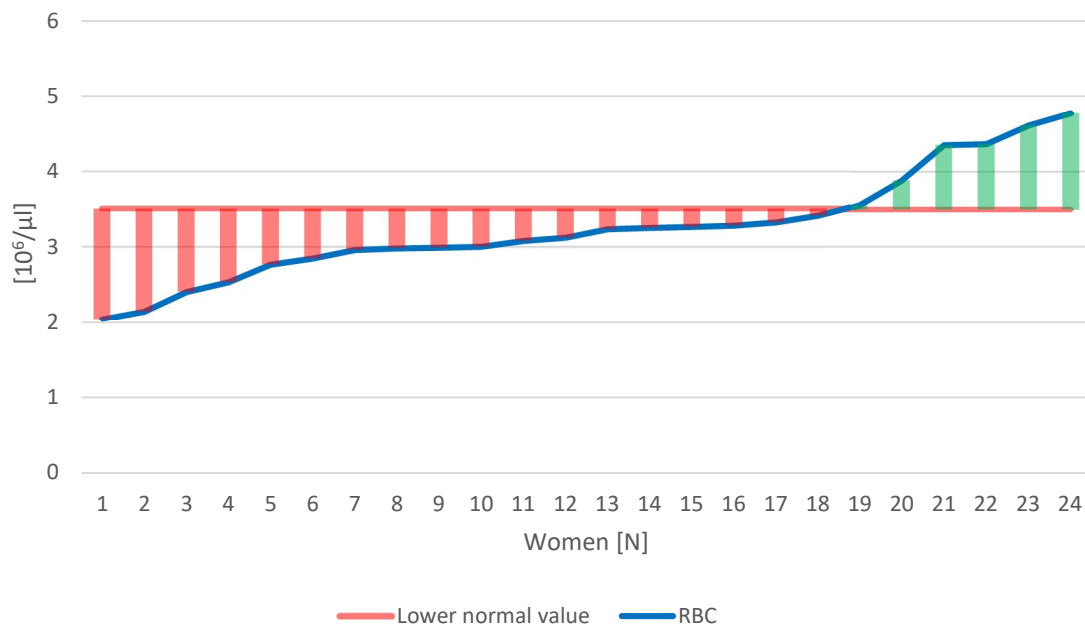
**Figure 3.** Values of haematocrit depending on the lower end of normal limits among males.



**Figure 4.** Values of blood platelets depending on the lower end of normal limits among males.

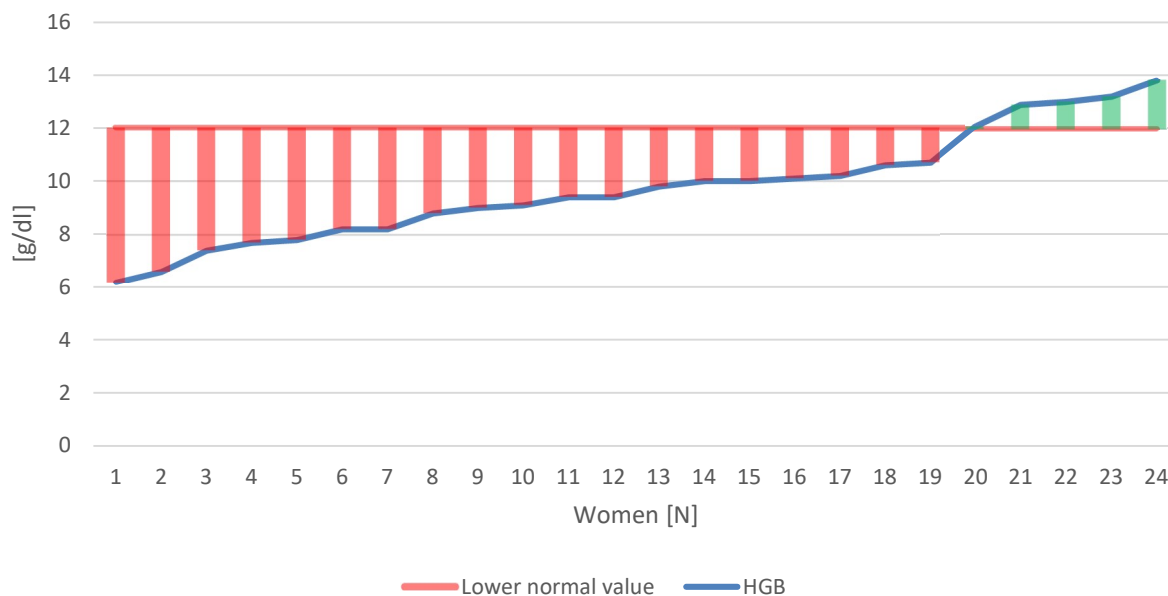
### Analysis of selected laboratory test results among females

The mean number of erythrocytes among females was  $3.26 \cdot 10^6/\mu\text{L}$  (SD=0.70). The number of results below normal limits was 19, which accounted for 79.16% of all females. The lowest value was  $2.05 \cdot 10^6/\mu\text{L}$  and the highest  $4.77 \cdot 10^6/\mu\text{L}$  (Fig. 5).

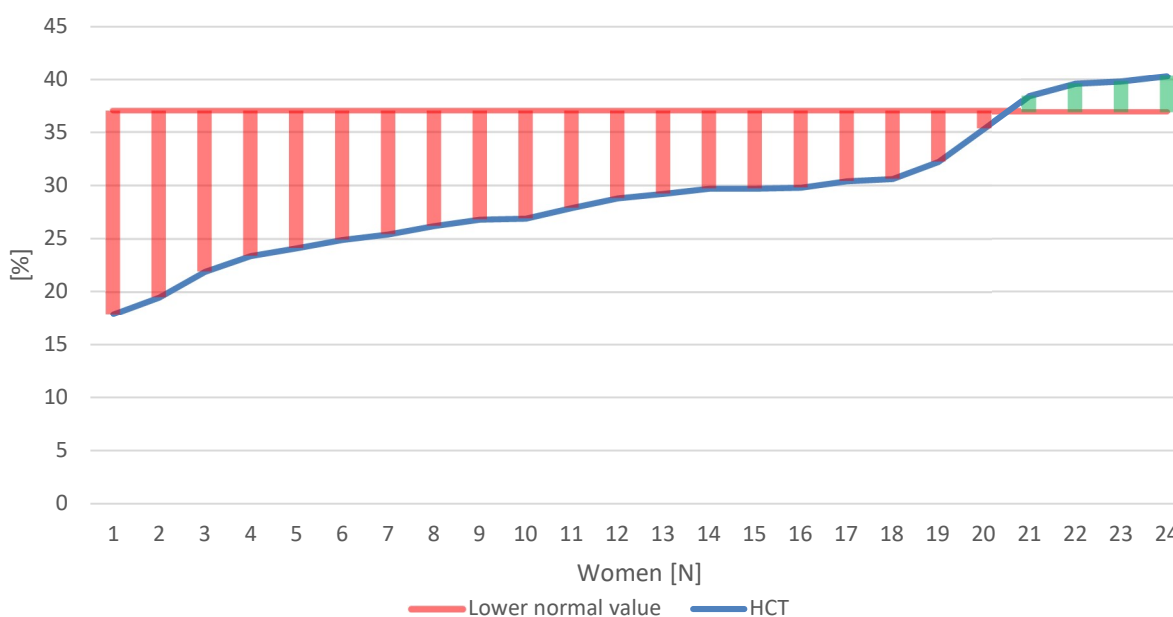


**Figure 5.** Values of erythrocytes depending on the lower end of normal limits among females.

The mean value of haemoglobin was 9.76 g/dL (SD=2.03). The number of results below normal limits was 19, which accounted for 79.16% of all females. The lowest value was 6.2 g/dL and the highest 13.8 g/dL (Fig.6). The mean level of haematocrit was 29.12% (SD=6.02). The number of results below normal limits was 20, which accounted for 83.3% of all females. The lowest value was 17.9% and the highest 40.3% (Fig.7).

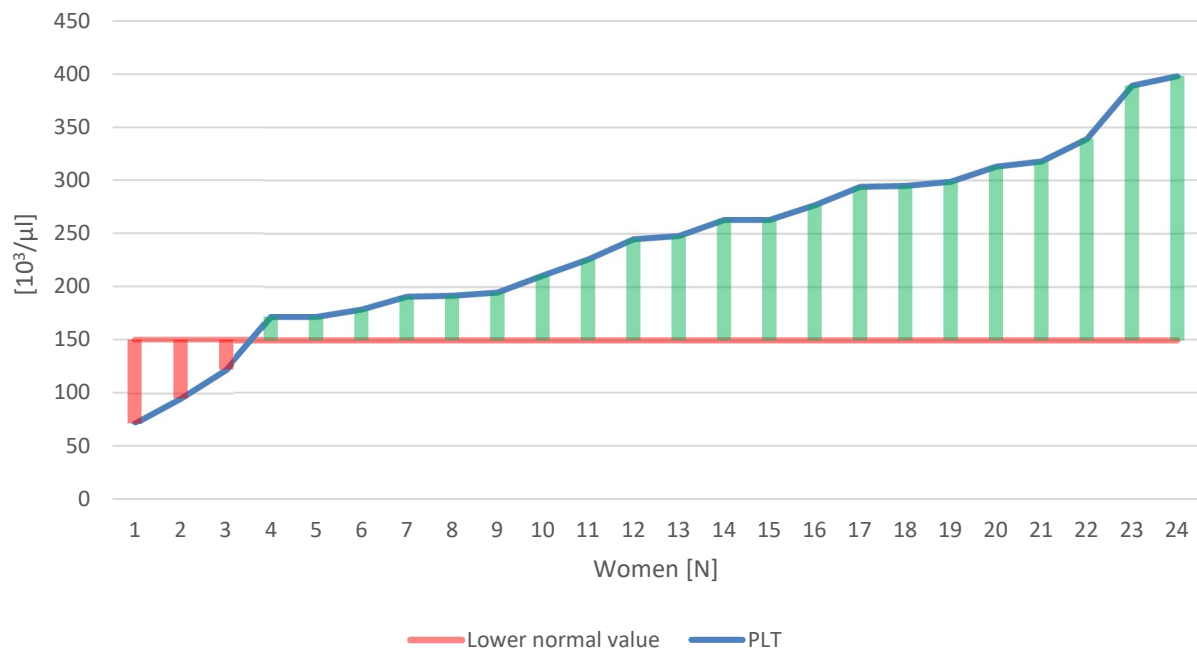


**Figure 6.** Values of haemoglobin depending on the lower end of normal limits among females.



**Figure 7.** Values of haematocrit depending on the lower end of normal limits among females.

The mean number of blood platelets was  $240.33 \times 10^3/\mu\text{L}$  (SD=82.72). The number of results below normal limits was 3, which accounted for 12.5% of all females. The lowest value was  $72 \times 10^3/\mu\text{L}$  and the highest  $398 \times 10^3/\mu\text{L}$  (Fig. 8).



**Figure 8.** Values of blood platelets depending on the lower end of normal limits among females.

## DISCUSSION

The study group including patients with bleeding into the gastrointestinal tract referred to hospital on an emergency basis was a small percentage (6.64%) of patients with symptoms of bleeding into the gastrointestinal tract referred by primary healthcare physicians for elective admissions. The authors paid particular attention to that group because of a high risk of quick exacerbation of the condition of the patients, who – despite critically low morphotic parameters – reported to hospital on their own. On admission to hospital, all patients included in the study were subject to a standard of treatment according to the recommendations of the Polish Society of Gastroenterology.

The most frequent profile of the patient in the analysed group was a senior male (mean age of 65.02). On the basis of literature data, it was determined that this is the statistical age of patients with bleeding to the gastrointestinal tract [4-5]. The literature also confirms an increase in the occurrence of bleedings from the upper GI tract in males (on average two times more frequently than in females) [6]. The most frequent (n=34) diagnosis was *gastrointestinal haemorrhage, unspecified*, marked with the ICD-10 code of K92.2. However, it must be stressed that this is the diagnosis made on admission, and so before the performance of diagnostic examinations allowing determination of the direct cause of the haemorrhage. The mean hospitalisation time was 5.11 days. In 2018, Krasuska and Guzel demonstrated in their retrospective analysis involving 151 patients with bleeding into the gastrointestinal tract that the mean hospitalisation time was 7 days [7], which

is a slightly longer period. In an own study, the hospitalisation time of patients was affected by introduction of transfusion of blood (Spearman's  $\rho=-0.318$ ;  $p=0.017$ ) and plasma (Spearman's  $\rho=-0.316$ ;  $p=0.018$ ). In turn, these therapies were significantly dependent on laboratory test results of RBC ( $p=0,000$ ), HGB ( $p=0.001$ ) and HCT ( $p=0.000$ ). Therefore, it may be assumed that the hospitalisation time is indirectly dependent on laboratory test results.

In the study group, the mortality of patients was 1.78%, which is a very low percentage. Intra-hospital mortality is the mostly affected by such factors as advanced age and concomitant diseases [8-9]. It is worth pointing out that as age goes up, so does the probability of developing a neoplasm in the lower gastrointestinal tract. What is more, positive family history of neoplasms increased the risk of it developing. Blood loss is usually slow, which may only lead to symptoms of latent bleeding, the detection of which can be possible only by means of laboratory tests. In addition, chronic anaemia was exhibited in most cases. [10]. The initial laboratory test results were analysed, taking the following into consideration: the number of erythrocytes, the value of haemoglobin, the level of haematocrit and the value of blood platelets. Both in males and in females, the results of the number of erythrocytes ( $10^6/\mu\text{L}$ ) below normal limits ( $4.2 \cdot 10^6/\mu\text{L}$  for males and  $3.5 \cdot 10^6/\mu\text{L}$  for females) were a high percentage: 75%. In all studied males and females, the percentage of results below normal limits (13 g/dL and 12 g/dL, respectively) was 81.25% and 79.16%, respectively. In the study, the number of males and females in whom the level of haematocrit was below normal limits (40% for males and 37% for females) was 81.25% and 83.3%, accordingly. The only morphotic blood element which showed normal values most of the time were blood platelets, the lower end of normal limits is  $150 \cdot 10^3/\mu\text{L}$  both for males and for females. The number of results below normal limits in males was merely 21.87%; in females it was 12.5%.

The patients referred for hospital treatment on an emergency basis were seniors with laboratory test results below normal limits and with developed anaemia [11]. This was demonstrated by a considerable decrease in haemoglobin, haematocrit and the number of erythrocytes in blood. The patients warranted treatment with packed red blood cells and plasma. In the study, the number of patients warranting treatment supplemented with blood transfusion was 39, which accounted for 69.64% of the study group. It must be stressed that the value of haemoglobin was below 8 g/dL in as many as 18 patients.

The lack of comparison (in the studied period and region) of patients transported by an ambulance was the limitation of the study. Data comparison would allow evaluation of the initial condition of the patients in both groups (referred on an emergency basis and transported by an ambulance). The study was carried out in a medical facility without an accident and emergency department (A&E): it had the Admission Room only. It must be stressed that in the city where the study was carried out, there is a specialised voivodeship hospital, which gives possibilities of further development of studies into bleedings into the gastrointestinal tract through multi-centre analysis.



Referral of patients on an emergency basis by primary healthcare physicians seems justified. However, it is worth considering the participation of an accident and emergency department in transport to hospital due to the fact that some patients had laboratory test results much below the normal limits (the lowest haemoglobin in males was 3.5 g/dL).

## CONCLUSIONS

The patients referred on an emergency basis by primary healthcare physicians for diagnostics and inpatient therapy were usually seniors with laboratory test results (RBC, HBG, HCT) much below the lower end of normal limits. Bleedings were more frequently observed in males. They were patients with developed anaemia, who warranted treatment accompanied by blood transfusion. Prompt introduction of treatment in patients with bleeding into the gastrointestinal tract in the study group allowed achieving higher survival rate. However, it is worth considering early diagnostics if disconcerting symptoms occur as patients referred for hospitalisation by primary healthcare physicians can be in a life-threatening condition already.

## SUPPLEMENTARY INFORMATION

**Funding:** *This research received no external funding.*

**Institutional Review Statement:** *The study was conducted according to the guidelines of the Declaration of Helsinki.*

**Informed Consent Statement:** *Informed consent was obtained from all subjects involved in the study.*

**Data Availability Statement:** *The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.*

**Conflicts of Interest:** *The authors declare no conflicts of interest.*

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