

HOSPITAL MORBIDITY BY FERIPRIVE ANEMIA, IN ROMANIA

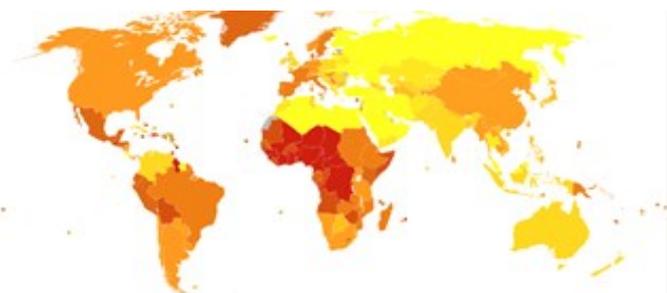
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INTRODUCTION.

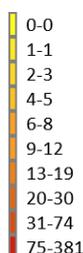
Around the world, almost a third of the population has suffered or is suffering from anemia due to iron deficiency or iron deficiency anemia. The prevalence of the disease depends very much on gender, age or race, being higher among women and children in the development period and with a low economic status. The main causes include poor iron diet, blood loss and intestinal disorders that prevent iron absorption in the body. Thus, anemia may appear as a disease of its own accord or it may supplement the clinical picture of other diseases whose consequence is the insufficient presence of iron in the body. Although it is so common, iron deficiency anemia may remain undiagnosed for years, due to symptoms that are either ignored and considered trivial or are attributed to other conditions. In mild or moderate forms, iron deficiency anemia may be completely devoid of symptoms, but severe anemia may lead to fatigue, exhaustion, chest pain or difficulty breathing [1]. (Figure 1)

Figure 1. Deaths due to iron-deficiency anaemia per million persons in 2012



The following groupings/assumptions were made: France includes the overseas departments as well as overseas collectivities. The United Kingdom includes the Crown dependencies as well as the overseas territories. The United States of America includes the insular areas. The Netherlands includes Aruba and the Netherlands Antilles. Denmark includes Greenland and the Faroe islands.

Statistics from WHO, grouped by deciles:



Anemia due to iron deficiency can remain undiagnosed for years because of symptoms that are either ignored and considered trivial or are attributed to other conditions. Iron deficiency anemia is not a disease in itself, but a symptom in other diseases, and detecting iron deficiency can lead to preventive or therapeutic behaviors that can streamline the clinical management of these diseases.

The most frequent pattern for the patient with FA hospitalized in the Romanian hospitals include the following most common characteristics (chi squared; p-value <0.05): women, aged in the age category 65-75 years, retired, with mandatory health insurance, admitted in hospital without admission letter, not as emergency case.

Concerns in this area should aim to develop correct behaviors for effective operation within clinical protocols, differentiated according to the pathological condition, but also by age categories.

Keywords: hospital care, iron deficiency, Romania, hospitalization pattern

The clinical management of the patient with iron deficiency anemia includes coordinated steps by which the iron deficiency in the body is identified, supplemented and maintained at normal values through diet, behavior and drug treatment. Untreated, the disease leads to serious consequences on the health of the individual who go up to heart failure or developmental disorders in children with iron deficiency, and therefore patients identified with iron deficiency should be monitored and should follow the therapeutic behavior until completion the deficit.

In Romania, iron deficiency anemia is the most common nutritional deficiency found in children. About 40% of preschoolers (according to data from the World Health Organization) and 23% of school-children in Romania face this problem (according to a study conducted by the Ministry of Health in partnership with UNICEF Romania) [2]. The problem is recognized and addressed at national level; in 2010, it was elaborated the Protocols for the prophylaxis of anemia and rickets in the child, a document that includes strategies of approach, as well as recommendations regarding the evaluation of the efficiency of the prophylactic treatment and iron drugs used in the prophylaxis of anemia in infants [3]. However, prevalence among children remains high, and many patients still have complications requiring hospitalization.

The objectives of this study were to identify patterns of hospitalization among these patients and to provide valid evidence for supporting decision-making process.

METHODS.

A cross-sectional study was conducted.

The source of data was represented by the National DRG (Diagnosis Related Groups) Database comprising hospital activity data reported at patient level, according to the Validation Rules of the hospitalized cases under continuous hospitalization.

The inclusion criteria - all hospitals under contract with the National Health Insurance House and reporting monthly these data at the National School of Public Health, Management and Professional Development Bucharest were included in this study.

Data extraction - data selection was made by using the SQL Server Management Studio Express 2005 software.

There were considered only hospital episodes with diagnosis of Feriprive Anemia (FA) according to the *ICD-10-AM*:

- D50.0 Other anemia due to iron deficien
- D50.1 Iron deficiency anemia secondary to blood loss (chronic);
- D50.8 Iron deficiency anemia, unspecified;
- D50.9 Sideropenic dysphagia.

RESULTS

The main findings of this study are describe bellow and this article will incorporate only results in terms of one indicator defined as hospital activity indicators: the number of hospitalized FA episodes/events.

Number of hospitalized FA episodes.

According with our findings, in Romania, during the year 2018, about 9265 episodes of hospitalization that can be classified as hospitalized FA episodes (see table 1) were recorded.

By gender, for the period January 2018 to December 2018, a total of 6093 hospitalized FA events were recorded for women, compared with 3182 FA events for men.

Demographic characteristics -by gender and residence

Almost twice as many women as men were hospitalized with the diagnosis of iron-deficiency anemia in Romanian hospitals, in 2018. Of these, slightly more than half were women from the urban area. The model is similar among men where more than half of them reside in urban areas. (Chart 1)

-by occupation

More than three quarters of the episodes of hospitalization with FA were of the unemployed or unemployed patients, which denotes an aggregation of cases with hospitalized AF in the category of persons with low economic status.

Chart 1. No. of hospitalized episodes with FA, by gender and residence

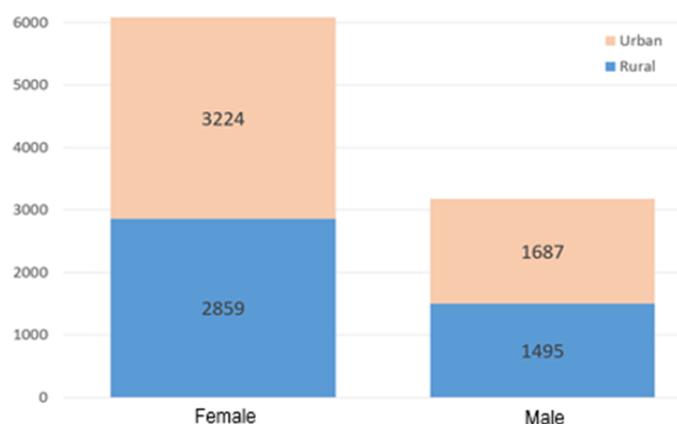


Table 1. No. of FA hospitalized episodes by residency and gender

Occupation	D50.0 Other anemia due to iron deficiency	D50.1 Iron deficiency anemia secondary to blood loss (chronic)	D50.8 Iron deficiency anemia, unspecified	D50.9 Sideropenic dysphagia	Total	% of total
Retired	1994	6	1352	1210	4562	49.2 %
Household	358	3	784	1358	2503	27.0 %
Employee	489	1	372	406	1268	13.7 %
Student	28	1	88	206	323	3.5 %
Unemployed	9		11	4	24	0.3 %
Self-employed	10		6	5	21	0.2 %
Farmer			1	4	5	0.1 %
Business owner	2				2	0.0 %
nonresponse	193	2	183	179	557	6.0 %
Total	3083	13	2797	3372	9265	100.0 %

Thus, most likely, poor iron diet was the main cause of the disease and the necessity for this person to be admitted in hospital.

Almost half of the patients are retirees, and more than a quarter did not have any occupation (in this category were included also children) at the time of admission. It can thus be concluded that the hospitalization by iron-deficiency anemia in Romania occurs, especially, in children (so, without occupation) and in the elderly; also, the economic component plays an important role in the occurrence and aggravation of this disease.

There was no statistical difference in the distribution of groups according to clinical type and occupation. (Table 1)

-Clinical type of hospitalized Feriprive Anemia (FA)

The International Classification of Diseases provides four disease codes that fall into the category of ferive anemia, respectively:

- D50.0 Other anemia due to iron deficien
- D50.1 Iron deficiency anemia secondary to blood loss (chronic);
- D50.8 Iron deficiency anemia, unspecified;
- D50.9 Sideropenic dysphagia.

The most common clinical type of AF recorded in the hospitalization database, at patient level, was Anemia due to unspecified iron deficiency (D50.8) with over one third of the FA diagnosed (3372 episodes of hospitalization), followed closely by Anemia due to iron deficiency secondary to a (chronic) blood loss (D50.1) and Other iron deficiency anemia (D50.0) with over 30% of hospitalizations (3083 hospitalizations, respectively 2797 hospitalizations) . Only 18 episodes of hospitalization were diagnosed with Sideropenic Dysphagia (D50.9).

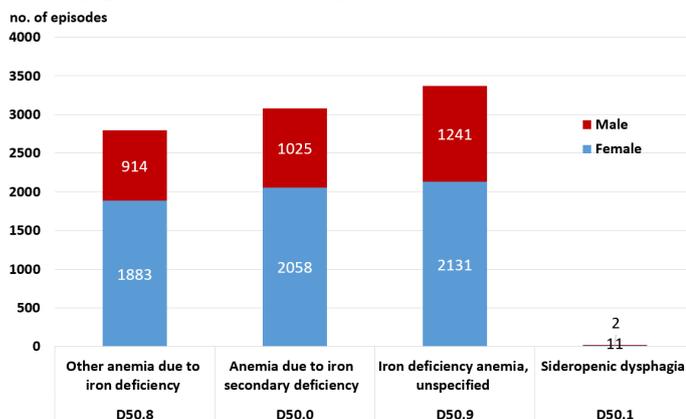
Table 2. No. and % of hospitalized episodes with diagnosis of FA, by age group and clinical type

Age group	D50.0 Other anemia due to iron deficiency	D50.1 Iron deficiency anemia second- ary to blood loss (chronic)	D50.8 Iron deficiency anemia, unspecified	D50.9 Sideropenic dysphagia	Total	% of Total	cumm %
<18ani	6	0	372	1077	1455	15.7%	15.7%
0-1an	0	0	67	284	351	3.8%	3.8%
1-5 ani	5	0	287	696	988	10.7%	14.5%
5-10ani	1	0	18	97	116	1.3%	15.7%
11-17ani	17	1	88	189	295	3.2%	18.9%
18-44ani	453	2	447	497	1399	15.1%	34.0%
45-64ani	687	2	498	434	1621	17.5%	51.5%
65ani+	1920	8	1392	1175	4495	48.5%	100.0%
Total	3083	13	2797	3372	9265	100.00%	

Table 3. Length of Stay for hospital episodes with FA, by clinical type

Code	Clinical type of FA	Length of Stay (days)			Episodes (no.)			Average Length of Stay (days)		
		Women	Men	Total	Women	Men	Total	Women	Men	Total
D50.0	Other anemia due to iron deficiency	11087	5589	16676	1883	914	2797	5.9	6.1	6.0
D50.1	Iron deficiency anemia secondary to blood loss (chronic)	12941	6917	19858	2058	1025	3083	6.3	6.7	6.4↑
D50.8	Iron deficiency anemia, unspecified	12080	7409	19489	2131	1241	3372	5.7	6.0	5.8
D50.9	Sideropenic dysphagia	91	6	97	11	2	13	8.3	3.0	7.5↑
	Grand Total	36199	19921	56120	6083	3182	9265	6.0	6.3	6.1

Chart 2. No. of hospitalized episodes with diagnosis of FA, by gender and clinical type



by age

The analysis of the episodes of hospitalization according to the age of the patients in each clinical type of FA reveals differences between the four groups, the average age differing from one group to another. Thus, the youngest mean age was recorded in the group of patients with disease code D50.9 Anemia due to iron deficiency, unspecified (40 years), followed by the group of patients with the disease code D50.0 Other anemia due to iron deficiency (54 years), while for the other two groups, the average age was 65 years. The lower mean age in the group of patients with anemia of iron deficiency, unspecified (D50.9) can be explained by the higher weight of children 0-5 years in this

group, compared to their weight in the other patient groups (29% vs. 12%).

From the analysis of the data by the large age groups we can notice the high weight of the subgroup of the elderly 65 years +, and this remark can be observed in all four clinical types of iron-deficiency anemia. A special mention should be made for children 1-5 years old, where FA predominates due to iron deficiency, unspecified (696 children, representing about 70% of children 1-5 years) and for Anemia due to iron deficiency secondary to blood loss (287 children, representing about 29% of children 1-5 years). (table 2)

by gender

Iron deficiency anemia occurs predominantly in women, regardless of the clinical type of the disease, as there is no statistical difference between the values of the masculinity index between the groups of patients with different disease codes. (Chart 2)

by Length of Stay

The 9265 episodes of hospitalization required 56,120 days of hospitalization, which account on average, about 6.1 days of hospitalization for each episode of hospitalization diagnosed with iron-deficiency anemia.

Longer hospitalization times were recorded for D50.1 Sideropenic dysphagia (7.5 days hospitalization, on average), respectively for D50.0 Anemia due to iron deficiency secondary to a blood loss (6.4 days hospitalization,



Table 4. Hospital departments with admissions for FA, acute and chronic

TYPE OF HOSPITALIZATION (hospital department)	Women	Men	Total	% of total
CHRONIC	256	181	437	100.0%
Chronic	167	95	262	60.0%
Pediatrics (pediatric recovery)	21	35	56	12.8%
Neonatology (premature)	20	20	40	9.2%
Geriatrics and gerontology	29	9	38	8.7%
Chronic Pediatrics	8	3	11	2.5%
Palliative care	2	8	10	2.3%
Medical - respiratory recovery	4	3	7	1.6%
Pneumology	1	4	5	1.1%
Medical recovery neurology	2	1	3	0.7%
Recovery, physical medicine and balneology	1	2	3	0.7%
Medical recovery - cardiovascular	1	1	2	0.5%
Acute	5827	3001	8828	% of total
Internal Medicine	2824	1407	4231	47.9%
Clinical hematology	1037	355	1392	15.8%
Pediatrics	584	692	1276	14.5%
Gastroenterology	436	256	692	7.8%
Obstetrics and Gynecology	567		567	6.4%
General surgery	67	63	130	1.5%
Hematology children	55	57	112	1.3%
Medical oncology	47	17	64	0.7%
Neonatology (nn and premature)	34	27	61	0.7%
Nephrology	42	10	52	0.6%
Pediatrics (pediatrics and pediatric recovery)	21	23	44	0.5%
Cardiology	27	14	41	0.5%
Pediatric Oncology	11	11	22	0.2%
Infectious diseases	7	10	17	0.2%
Gynecology	13		13	0.1%
Otolaryngology (ENT)	7	5	12	0.1%
Toxicology	3	9	12	0.1%
Children's cardiology	3	7	10	0.1%
Clinical immunology and allergic children	4	6	10	0.1%
Infectious diseases children	3	6	9	0.1%
Diabetes, nutrition and metabolic diseases	6	2	8	0.1%
Neurology	6	2	8	0.1%
Urology		8	8	0.1%
HIV AIDS	2	3	5	0.1%
Pneumology	2	3	5	0.1%
Pediatric surgery	3	1	4	0.0%
Endocrinology	3	1	4	0.0%
Child nephrology	1	2	3	0.0%
Orthopedics and traumatology	1	2	3	0.0%
Rheumatology	2	1	3	0.0%
Endocrinology children	1	1	2	0.0%
Pediatric neurology	2		2	0.0%
Intensive coronary therapy - UTIC	2		2	0.0%
Oncological surgery	1		1	0.0%
Neurosurgery	1		1	0.0%
Children's pneumology	1		1	0.0%
Adult bone marrow transplant	1		1	0.0%
Grand Total	6083	3182	9265	

Table 5. Lengths of Stay, by department

Hospital department	Chronic (ALOS)	Acute (ALOS)	Total (ALOS)
Neonatology (premature)	53.0	-	53.0
Neonatology (premature)	32.7	-	32.7
Pediatrics (pediatric recovery)	24.3	-	24.3
Palliative care	16.1	-	16.1
Medical - respiratory recovery	10.1	-	10.1
Chronicles	9.9	-	9.9
Urology	-	9.8	9.8
Orthopedics and traumatology	-	9.7	9.7
Medical recovery neurology	9.7	-	9.7
Geriatrics and gerontology	9.6	-	9.6
Chronic Pediatrics	8.7	-	8.7
Pneumology	-	8.6	8.6
Oncological surgery	-	8.0	8.0
Pneumology	8.0	-	8.0
Rheumatology	-	8.0	8.0
Pediatric surgery	-	7.8	7.8
Neonatology (newborn and premature)	-	7.8	7.8
Medical oncology	-	7.5	7.5
Intensive coronary therapy	-	7.0	7.0
Internal Medicine	-	6.9	6.9
Neonatology (premature)	6.7	-	6.7
Diabetes, nutrition and metabolic diseases	-	6.6	6.6
Nephrology	-	6.4	6.4
Endocrinology	-	6.3	6.3
Other departments	<6.1	<6.1	<6.1
Total	12.0	5.8	6.1

Table 6. Type of admission, by hospital departments

Type of admission	Cronic	Acut	Grand Total	%
No referral	89	5347	5436	58.7%
Referral from Family Doctor	124	2129	2253	24.3%
Referral from specialist physician	199	1250	1449	15.6%
Inter-hospitals transfer	18	68	86	0.9%
Others	7	30	37	0.4%
On demand		4	4	0.0%
Grand Total	437	8828	9265	100.0%

Table 7. Discharge status, by departments

Discharge status	Chronic	Chronic %	Acute	Acute%	Total	Total%
Improved	348	79.6%	7642	86.6%	7990	86.2%
Stationary	30	6.9%	561	6.4%	591	6.4%
Cured	36	8.2%	490	5.6%	526	5.7%
Worsen	19	4.3%	63	0.7%	82	0.9%
Deceased	4	0.9%	72	0.8%	76	0.8%
	437	100.0%	8828	100.0%	9265	100.0%

on average), for which there is a need for a detailed diagnosis of certainty and to differentiate the diagnosis with other pathological conditions (table 3).

-by admission type

More than 95% of episodes were hospitalized in acute hospitals departments or acute hospitals, and only 5% required long-term hospitalization; while acute hospitalizations were in the departments of Internal Medicine, Hematology, Pediatrics and Gastroenterology (over 80% of

acute hospitalizations), the need for long-term hospitalization occurred in the Chronic, Pediatric (pediatric recovery), Neonatology (premature) sections, Geriatrics and gerontology (over 90% of chronic admissions). (table 4)

By far, chronic cases required several days of hospitalization, on average, and the sector with the highest average length of hospitalization for AF cases were those for chronic patients (between 10-50 days hospitalization for one episode). Of the acute care units, the urology sections (9.8 days hospitalization, on average) and orthopedics (9.7 days hospitalization, on average) had the longest length of stay, one of the explanations being the higher risk of anemia following laborious surgery leading to greater blood loss. (table 5)

- by admission type

The referral through a admission letter from the specialist doctor was the most frequent model registered for the episodes of admission on chronic sections. On the other hand, for the hospitalizations on acute departments, there is a very high percentage (59%) of the cases without admission letter, while the hospitalization by the family doctor represents only 24%. (table 6)

- by discharge status

The cases hospitalized in chronic departments were solved in a significantly lower proportion, compared to those in the acute departments. Only 1.5% of the cases from the acute care units were discharged in aggravated condition or death occurred during the hospitalization, while the proportion (5.2%) among the cases from the chronic sections was more than 3 times higher. (table 7)

**CONCLUSIONS.
DISCUSSIONS.**

The most frequent pattern for the patient with FA hospitalized in the Romanian hospitals include the following most common characteristics (chi squared; p-value <0.05): women, aged in the age category 65-75 years, retired, with mandatory health insurance, admitted in hospital without admission letter, not as emergency case (table 8).

For almost 92% of patients with FA, the health services provided during the hospital stay led to an improvement in health; only about 1% of patients with AMI died during the hospitalization.



Table 8. No. of hospitalized episodes with diagnosis of FA, by demographic and clinical characteristics

CHARACTERISTICS	No. of Episodes	% of Episodes
Gender		
Women	6083	65.7%
Men	3182	34.3%
Residential environment		
Rural	4354	47.0%
Urban	4911	53.0%
Age group		
<18year, from which:	1455	15.8%
0-1years	351	3.80%
1-5 years	988	10.70%
5-years	116	1.30%
11-17 years	295	3.20%
18-44 years	1399	15.10%
45-64 years	1621	17.50%
>65 years	4495	48.50%
Occupation		
Household	2503	27.0%
Employee	1268	13.7%
Self-employed	21	0.2%
Business owner	2	0.0%
Farmer	5	0.1%
Pupil / student	323	3.5%
Unemployed	24	0.3%
Retired	4562	49.2%
Education		
Without studies	2238	24.2%
Primary cycle	1270	13.7%
Gymnasium cycle	2096	22.6%
Vocational school	848	9.2%
High school	1654	17.9%
Post secondary school	196	2.1%
Short-term higher education	60	0.6%
Higher education	412	4.4%
Addmission type		
Chronic	437	4.7%
Acute	8828	95.3%
Addmission criteria		
No referral	5436	58.7%
Referral from Family Doctor	2253	24.3%
Referral from specialist physician	1449	15.6%
Inter-hospitals transfer	86	0.9%
Others	37	0.4%
On demand	4	0.0%
Discharge status		
Improved	7990	86.2%
Stationary	591	6.4%
Cured	526	5.7%
Worsen	82	0.9%
Deceased	76	0.8%
Clinical type		
Other anemia due to iron deficiency	2797	30.2%
Iron deficiency anemia secondary to blood loss (chronic)	3083	33.3%
Iron deficiency anemia, unspecified	3372	36.4%
Sideropenic dysphagia	13	0.1%
Total	9265	100.0%

It should be noted that iron deficiency anemia is not a disease in itself, but a symptom in other diseases, and the detection of iron deficiency can lead to preventive or therapeutic conduits that can streamline the clinical management of these diseases. Concerns in this area should aim to develop correct behaviors for effective operation within clinical protocols, differentiated according to the pathological condition, but also by age categories.

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