

Blood economy run by a blood bank and the demand for Packed Red Blood Cells in selected wards of the Gorlice Hospital in the years 2013-2015

Gospodarka krwią prowadzona przez bank krwi a zapotrzebowanie na Koncentrat Krwinek Czerwonych w wybranych oddziałach Szpitala Specjalistycznego w Gorlicach w latach 2013-2015

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Streszczenie

Wstęp. W ciągu ostatnich kilku lat, możemy zaobserwować wzrastające zapotrzebowanie na preparaty krwio-pochodne. Zabieg transfuzji krwi to niejednokrotnie jedyny sposób, aby ocalić ludzkie życie. Na świecie liczba wykonanych transfuzji krwi wynosi około 80 mln rocznie, w Polsce to około 2-3 mln. **Celem pracy** było wykazanie zapotrzebowania na Koncentrat Krwinek Czerwonych na oddziale Geriatrycznym, Internistyczno-Kardiologicznym oraz Internistyczno-Endokrynologicznym Szpitala Specjalistycznego w Gorlicach w latach 2013-2015. **Material i metody.** Przeprowadzono analizę dokumentacji medycznej 1127 pacjentów, hospitalizowanych w wyżej wymienionych oddziałach, u których wykonano zabieg transfuzji krwi. **Wyniki.** Zabieg transfuzji krwi najczęściej wykonuje się u pacjentów w wieku podeszłym, w głównej mierze wśród płci żeńskiej. Do najczęściej wykonywanej transfuzji krwi należy transfuzja planowana. Pacjenci, u których wykonuje się zabieg transfuzji to najczęściej osoby, które są wielokrotnymi biorcami krwi. **Wnioski.** Zapotrzebowanie na transfuzje krwi wśród pacjentów utrzymuje się na niezmiennie wysokim poziomie. *Geriatrics 2018; 12: 5-10.*

Słowa kluczowe: transfuzja krwi, koncentrat krwinek czerwonych, bank krwi

Abstract

Background. In the past few years, an increasing demand for blood products has been observed. A blood transfusion is often the only way to save lives. Worldwide, the number of blood transfusions performed is around 80 million per year whereas in Poland it is approximately 2-3 mln. **The aim of the study** was to demonstrate the need for Packed Red Blood Cells in the Geriatric Ward, the Ward of Internal Medicine and Cardiology as well as the Ward of Internal Medicine and Endocrinology of the Specialist Hospital in Gorlice in 2013-2015. **Material and methods.** An analysis was performed of the medical records of 1,127 patients hospitalized in the above-mentioned wards who underwent a blood transfusion. **Results.** A blood transfusion is usually performed in old-elderly patients, mainly females. The most commonly performed blood transfusion is planned transfusion. Patients who undergo transfusions are usually people who are multiple blood recipients. **Conclusions.** The demand for blood transfusions remains at a consistently high level. *Geriatrics 2018; 12: 5-10.*

Keywords: blood transfusion, packed red blood cells, blood bank

Introduction

Approximately 2-3 million transfusions of blood and its preparations are performed every year in Poland. Blood is given to people who have shortages of blood and its components, for instance as a result of a surgery, injury, burns, or sustained injury or trauma [1]. A blood transfusion is a treatment involving the transfusion of blood or blood components. Its purpose is to supplement the lost blood substitutes. Unfortunately, the consumption of blood derivatives such as packed red blood cells is still growing. In 2008 hospitals in Poland received 985,067 units of this product, whereas in 2014 the figure was already 1,127,076. The above numbers indicate that the demand for blood continues to increase and it is one of the most important drugs which cannot be manufactured [2].

A blood transfusion is used only in justified cases, at a time when there are no other treatments left, and when the risks associated with the transfusion of blood is less than the expected effect of treatment. The medical staff employed in institutions which perform blood transfusions are required to complete specialized training in transfusion medicine. This is the only way to ensure patient safety and high quality of care [3]. A very important issue is also the blood economy run in hospitals [2].

The continuous development of clinical transfusion medicine and the implementation of new standards in hemotherapy result in an increased use of blood components. The increasing use of blood and blood components requires adequate supervision and control as well as management procedures which are associated with blood transfusion [4].

A proper quality system maintained in a hospital provides an adequate hemotherapy that is safe and effective. This is possible only if a hospital employs a team of professionals who are responsible for blood economy. A comprehensive and appropriate knowledge of the use of blood in hemotherapy and its promotion ensures that blood products which are used for treatment are adequately developed and will bring the patient the greatest benefit [5].

The aim of the study

The aim of the study was to demonstrate the need for Packed Red Blood Cells at the Geriatric Ward, the Ward of Internal Medicine and Cardiology as well as the Ward of Internal Medicine and Endocrinology of the Specialist Hospital in Gorlice in 2013-2015.

Material and methods

An analysis was made of the medical records of 1,127 patients hospitalized at the Geriatric Ward, the Ward of Internal Medicine and Cardiology as well as the Ward of Internal Medicine and Endocrinology of the Henryk Klimontowicz Specialist Hospital in Gorlice in 2013-2015.

Verification of the differences between variables was made using the χ^2 test of independence as well as Mann-Whitney test. In addition, use was made of compatibility test χ^2 , adopting the significance level at p -value < 0.05 . Calculations were made with the use of the SPSS programme. The study was conducted according to ethical principles and good research practice compliant with the Helsinki Declaration.

Results

Among the patients under examination, 54.9% were women and 45.1% men. The differences in the number of men and women were statistically significant ($p = 0.0009$), which means that a blood transfusion was performed more often in women than in men.

Blood transfusions were performed more frequently in people aged 76-85 years, less frequently in patients under 76 years of age, with people aged 86 and more ($p < 0.0001$) being the least numerous group of all. The average age of the women (75.29 years) was significantly higher than the average age of the men (70.91 years) ($p < 0.0001$).

Among the patients there were 43.8% first-time blood recipients and 56.2% repeated blood recipients ($p < 0.0001$). Most patients (96.6%) had had scheduled transfusion. Only in 3.4% of cases had it been an urgent transfusion. The differences in the number of groups were statistically significant ($p < 0.0001$).

In 2013, the number of red blood cells supplied by the Blood Bank was 2,193, in 2014 it rose to 2,494 units, and in 2015 it amounted to 2,335 units. Most transfusions of blood and its components occurred in 2014 (36.0%). The percentage of transfusions in the 2013-2015 period did not change significantly ($p = 0.0705$) (Figure 1).

An analysis was made of the number of post-transfusion complications that had occurred in the hospital. The Gorlice Hospital recorded one such incident in 2014; in 2013, the internal medicine ward revealed the presence of anti-HLA antibody. The last of the 3 reported adverse events from the three-year period took place in 2014: in the internal medicine ward after

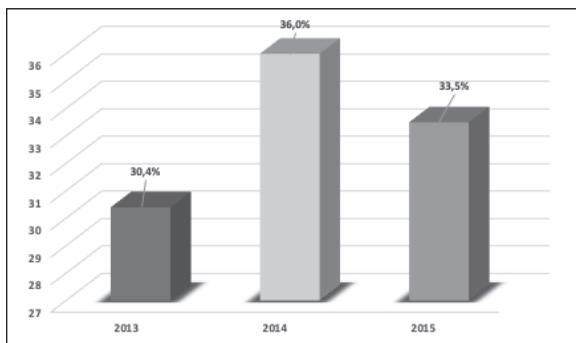


Figure 1. Percentage of transfusions performed at internal medicine and geriatric wards in 2013-2015

a blood transfusion the presence of immune antibodies to red blood cell antigens was revealed.

In 2013, 52.5% of the women and 47.5% of the men ($p = 0.3587$) had blood transfusions. Most of the patients stayed at the internal medicine ward equipped with 78 beds (66.8%). The geriatric ward housed 33.2% of the patients (48 beds). The differences in numbers were statistically significant ($p < 0.0001$). In most cases (96.8%) those were scheduled transfusions ($p < 0.0001$), and most of the recipients were repeated blood recipients (61.2%, $p < 0.0001$). In 2013, blood transfusion was performed more frequently in the 76-85-year-old and 65-75-year-old age groups (37.9% and 31.8%, respectively). It was less frequently performed in the patients under 65 (17.2%) or above 85 (13.1%).

In 2014, 54.9% of the women and 45.1% of the men ($p = 0.0471$) had blood transfusions. Most of the patients stayed at the internal medicine ward (75.6%; $p < 0.0001$). In most cases those were scheduled transfusions (97.0%; $p < 0.0001$). Most of the recipients were repeated blood recipients (57.1%; $p = 0.0040$). In 2014, blood transfusion was performed most frequently in the 76-85-year-old (40.9% $p < 0.0001$). It was less frequently performed in the patients under 65 (23.2%) or between 66 and 75 (24.4%), with the patients over 85 having the transfusion performed the least frequently (11.6%).

In 2015 blood transfusions were performed significantly more frequently ($p = 0.0055$) in the women (57.1%) than in the men (42.9%). Most of the patients (61.9%; $p < 0.0001$) stayed at the internal medicine ward. In most cases (96.0%; $p < 0.0001$) those were scheduled transfusions. The differences between recipient types were not statistically significant ($p = 0.8730$) as there were 49.5% first-time recipients and 50.5% repeated recipients. There were slight differences indicating that in 2015 blood transfusions in the patients between 76 and 85 years old (30.2%) were more frequent than in the patients under 65 (21.7%), between 65 and 75 (21.7%) or over 85 years old (21.2%).

The number of women to undergo blood transfusion was found to have increased in the years 2013-2015. Similarly, the number of first-time recipients grew, the number of patients under 65 increased, whereas the number of patients between 65 and 75 decreased.

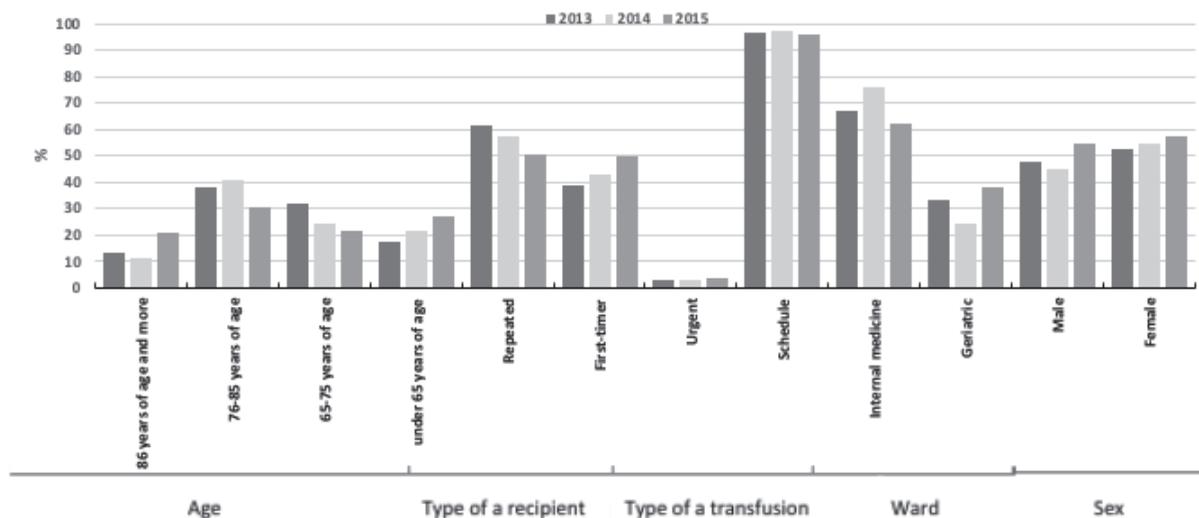


Figure 2. Transfusions performed at the internal medicine and geriatric wards in 2013-2015

The study showed that in the 2013-2015 period 96.6% women and 96.7% men underwent scheduled transfusions ($p = 0.9660$). The study revealed that in the internal medicine ward there were 96.1% scheduled transfusions in the 2013-2015 period whereas the percentage was 97.8% in the geriatric ward ($p = 0.1521$).

The age of the patients did not significantly affect the type of transfusions performed ($p = 0.4607$). Scheduled transfusions were performed in 95.3% of the patients less than 65 years of age, 97.2% of the patients aged 65-75, 97.3% of the people aged 76-85 years and 95.9% of the patients aged 86 and more. It was found that women significantly more often (46.7%) than men (40.4%) were first-time recipients ($p = 0.0330$) (Figure 2).

In the geriatric ward there were significantly more first-time recipients (49.6%) than in the internal medicine ward (41.2%; $p = 0.0081$). First-time recipients were found to be most frequently people aged 86 and over (53.5%); followed by the first-time recipients under 65 years of age (47.1%), with the smallest range of first-time recipients being between 65-75 years (38.6%) and 76-85 years (41.5%). The differences were statistically significant ($p = 0.0084$). The age of the patients did not considerably differ between years. There were slight differences that implied that the percentage of the women undergoing transfusions increased (from 52.5% in 2013 to 57.1% in 2015) ($p = 0.4537$).

In 2013, there were 96.8% scheduled transfusions. In 2014 their number rose to 97.0%, only to fall to 96.0% in 2015. The differences were not statistically significant ($p = 0.7200$). In 2013, there were 38.8% first-time recipients. The following year, this number increased to 42.9% and in 2015 it was 49.5%. The differences were statistically significant ($p = 0.0136$).

The age of the recipient patients changed significantly in each year of the period under examination. In 2013 there were 17.2% of those under 65 years of age. In the next two years, this number increased significantly (23.2% in 2014 and 27.0% in 2015). For the patients aged 65-75, the largest number of transfusions were performed in 2013 (31.8%), and in the following two years the percentage of people in this age group was lower (24.4% in 2014 and 21.7% in 2015, respectively). The patients from the 76-85 age group were found to be significantly more numerous in 2013 (37.9%) and 2014 (40.9%) than in 2015 (30.2%). The people aged 86 and more had transfusions performed more frequently

2015 (21.2%) than in 2013 (13.1%) and 2014 (11.6%) ($p < 0.0001$).

Discussion

The effectiveness of blood service in Poland can be assessed by means of blood supply self-sufficiency and blood components. The use of blood and its derivatives is still growing. It is therefore important to monitor the increasing demand for blood in medical institutions and healthcare facilities to adequately meet their requirements and strive for self-sufficiency of the Republic of Poland in this regard. In recent years a growing number of hospitals have been seen to increase demand for Packed Red Blood Cells. According to the Institute of Hematology and Blood Transfusion, in 2010 1 063 935 units of packed red blood cells were delivered to hospitals throughout the country. This number increased significantly in 2013, when it amounted to 1 333 536 units issued for transfusion. Blood product supplies for hospitals are possible owing to an efficient functioning of Blood Banks [6].

Despite intensive efforts of scientists, no synthetic substance that could replace blood has been invented. In recent years an increase in the number of people in post-working age has been observed in Poland. According to the Central Statistical Office, in 2014 the figure was 7 million, and it had increased by as many as 226 000 [7] when compared to 2013. The lifespan of the population is extending, which is connected with the development of civilization and a better quality of medical care, which will in the future entail more hospitalizations of the elderly. A continuous development in medical fields imposes the need for more and more complex treatments. This is only possible owing to an adequate provision of patients with blood during surgery. Polish society is aging, which may cause problems with securing proper amounts of blood, as a decrease in the number of potential blood donors is also to be expected [8].

Following the definition of the World Health Organization concerning anemia (hemoglobin concentration < 12 g/dl in women and < 13 g/dl in men), more than 10% people in the world over 65 years of age should be considered anemic. Unfortunately, the prevalence of anemia increases with age, approaching 50% in patients with chronic diseases. In 2002 a study was conducted in Finland that provided up-to-date information concerning the consumption of blood for specific age groups. Being very disturbing, these

data showed a marked increase in the consumption of packed red blood cells with age. An increased demand for blood was found in patients over the age of 50, while the consumption of blood in those aged 70-80 was eight times as high as that in those aged 20-30 [9]. Old-elderly patients are the most numerous group in our society. The analysis of the transfusions in the geriatric and internal medicine wards shows that blood transfusions were by far the most common in people aged 76-85 (36.4%). Anemia caused by chronic diseases, latent bleeding, malnutrition or medication taking, can have a significant impact on the lives of the old-elderly [10].

A study conducted by PolSenior study group was supposed to demonstrate the problem of anemia in the elderly. A representative study group consisted of people living in Poland, ranging in age from 55 to over 80 years of age. Anemia was detected in 695 old-elderly people under examination, but only in 19 pre-elderly people. It can be assumed that this condition is associated with the incidence of many chronic diseases in the old-elderly which foster the occurrence of anemia. Such a situation may also be associated with a decreased production of erythropoietin in the old-elderly, which is responsible for hematopoiesis [11].

Our analysis of the results of the study in the Gorlice hospital showed that with the passage of years, the percentage of transfusions performed increases significantly among women. In 2013 it amounted to 52.5%, in 2014 it was 54.9% and in 2015 it rose to 57.1%. Women rather than men have a greater need for iron, which is indispensable in order to avoid anemia [10]. Taking the sex of the people under study into account, the PolSenior survey found that blood transfusions were more frequent in men. An analysis of different macro-regions in the southern part of Poland, however, showed that transfusion was performed more frequently in women (50.7%). A similar situation can be found in the wards under examination, because transfusion was performed in as many as 54.9% of the women. This can be attributed to a higher life expectancy in women than in men [11].

Notice should be taken of the comparative study of blood consumption which was carried out in Rzeszów. In 2006 8 540 512 ml packed red blood cells orders were placed while in 2012 this number rose to 11 632 695 ml, which is a 36% increase [12]. On the basis of our own research, an increase has been noted in the demand for packed red blood cells in recent years. In 2013, the number of red blood cells distributed by the Blood Bank was in 2 193, whereas in 2014 it increased to 2 494 units.

As is supported by a large body of source literature, allergic reactions are the most common post-blood transfusion complications and their total number ranges from 1: 100. The Gorlice hospital recorded 3 such incident in the years 2013-2015. Such a small percentage of adverse events show that the blood products are becoming increasingly safe to use [12].

Conclusions

1. Blood transfusions are performed most frequently in old-elderly patients, more often in women than in men, and in people who have already had blood transfusions performed.
2. Blood transfusions are far more frequently performed as scheduled than as urgent ones.
3. Because of the very frequently scheduled blood transfusions in the old-elderly, having regular blood counts in the geriatric population appears to be justified.

Konflikt interesów / Conflict of interest

Brak/None

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