IKSAD INSTITUTE
Institute of Economic Development and Social Research

ROMANIAN ACADEMY
National Institute for Economic Research "Costin C. Kiriţescu"

RebResNet
Science through network
Research Network on Resources Economics and Bioeconomy Association

VI-INTERNATIONAL EUROPEAN CONFERENCE ON INTERDISCIPLINARY SCIENTIFIC RESEARCH

August 26-27, 2022 / Bucharest, Romania

National Institute for Economic Research "Costin C. Kiritescu" (INCE), Romanian Academy

ABSTRACTS BOOK

Editors
Prof. Dr. Luminita CHİVU
Assist. Prof. Dr. Mehmet Emin KALGI

ISBN: 978-625-8213-29-4
by IKSAD Publishing House

VI-INTERNATIONAL EUROPEAN CONFERENCE ON INTERDISCIPLINARY SCIENTIFIC RESEARCH

26-27 August 2022/ Bucharest, Romania

FULL TEXTS BOOK

Edited by

Assist. Prof. Dr. Mehmet Emin KALGI
Prof. Dr. Luminita CHİVU

by
IKSAD PUBLISHING HOUSE®

https://iksadyayinevi.com/

Issued: 20.09.2022

ISBN: 978-625-8213-38-6

COST ANALYSIS OF HYPERBARIC OXYGEN THERAPY KONYA TARINING AND RESEARCH HOSPITAL 2019

HİPERBARİK OKSİJEN TEDAVİSİNİN KONYA EĞİTİM VE ARAŞTIRMA HASTANESİ 2019 MALİYET ANALİZİ

Ahmet Fatih ÖZYILMAZ

PhD. Can., Karamanoğlu MehmetBey University, Kazım Karabekir Vocational School, Department of Medical Services and Techniques, Karaman, Turkey

ORCID ID: 0000-0002-8400-0563

Emre NALÇACIGİL

Asst. Prof. Dr., Cappadocia University School of Applied Sciences Department of Aviation Management, Nevşehir, Turkey

ORCID: 0000-0001-9834-7472

ABSTRACT

Hyperbaric oxygen therapy has been highly developed in recent years due to rapidly developing technological developments. The system, which is usually in the hands of the private health sector in Turkey, has become widespread in our country with the Training and Research Hospitals of the Ministry of Health in metropolitan cities in recent years. Hyperbaric oxygen therapy centers have been established in the last 5 years to prevent permanent damage and loss of labor. In addition to its scientific and therapeutic benefits, this treatment saves people's lives and prevents them from becoming disabled.

In order to ensure continuity in the healthcare market, where competitive healthcare is offered, it is necessary to better measure and manage costs. Rapid developments in the economic and technological fields in the scope of health, along with the change in production technologies, have enabled the development of new production systems. From the business point of view of health institutions, it has been revealed that sustainability is not possible in enterprises with current SUT prices. Although private health institutions make the process profitable by taking an additional fee for treatment, public health institutions do not receive it, so institutions are making a loss with current SUT prices. With this study, all service items of private and public health institutions were discussed. To have sustainability; In the Official Journal dated 24.03.2013 and numbered 28597, it can be said that it would be beneficial to attempt to increase SUT prices by at least 50% in the social security institution health application communique.

In this study, the data of Konya Training and Research Hospital were used. The cost analysis of the center, where all the revenues and expenses of KEAH hyperbaric oxygen therapy, which is among the first hospitals in the public sector in Turkey, have been carefully examined, has been prepared to guide senior managers and decisionmakers.

Keywords: HBOT, Hyperbaric Oxygen Therapy, Cost Analysis in Health Institutions, KEAH

ÖZET

Hiperbarik oksijen tedavisi hızla gelişen teknolojik gelişmelerden son yıllarda oldukça geliştirilmiştir. Türkiye'de genellikle özel sağlık sektörünün elinde olan sistem, Sağlık Bakanlığının son yıllarda büyükşehirlerde Eğitim ve Araştırma Hastaneleriyle ülkemizde yaygınlaşmıştır. Hiperbarik oksijen terapi merkezleri son 5 yılda kalıcı hasar ve işgücü kaybını önlemek amacıyla kurulmuştur. Bu tedavi, bilimsel ve tedavi edici faydalarının yanı sıra insanların hayatlarını kurtarmakta ve sakat kalmalarını engellemektedir.

Rekabetçi sağlık hizmetlerinin sunulduğu sağlık hizmetleri pazarında sürekliliği sağlamak için maliyetleri daha iyi ölçmek ve yönetmek gerekir. Sağlık dünyasındaki ekonomik ve teknolojik alandaki hızlı gelişmeler, üretim teknolojilerindeki değişimle birlikte yeni üretim sistemlerinin gelişmesine sağlamıştır. Sağlık kurumlarına işletme açısından bakıldığında, mevcut SUT fiyatları olan işletmelerde sürdürülebilirliğin mümkün olmadığı ortaya çıkmıştır. Özel sağlık kurumları tedavi için ücret farkı alarak işlemi karlı hale getirse de halk sağlığı kurumları ücret farkı alamadığı için kurumlar mevcut SUT fiyatları ile zarar ediyor. Bu çalışma ile özel ve halk sağlığı kurumlarının tüm hizmet kalemleri tartışılmıştır. Sürdürülebilirliğe sahip olmak için; 24.03.2013 tarih ve 28597 sayılı Resmî Gazetede, sosyal güvenlik kurumu sağlık başvuru tebliğinde SUT fiyatlarını en az %50 artırma girişiminde bulunmanın faydalı olacağı söylenebilir.

Bu çalışmada; Sağlık Bakanlığı Konya İl Sağlık Müdürlüğü'ne bağlı 1460 yataklı Konya Eğitim ve Araştırma Hastanesi'nin verileri kullanılmıştır. Türkiye'de kamu sektöründe ilk HPO tedavisine başlayan hastaneler arasında bulunan KEAH hiperbarik oksijen tedavisinin tüm gelir ve giderlerinin titizlikle incelendiği merkezin maliyet analizi yapılarak üst düzey yöneticilere ve karar vericilere yol gösterilmesi için hazırlanmıştır.

Anahtar Kelimeler: HBOT, Hiperbarik Oksijen Tedavisi, Sağlık Kurumlarında Maliyet Analizi, KEAH

INTRODUCTION

Hyperbaric Oxygen Therapy (HBOT) is a scientific medical treatment method applied Underwater Medical Science and Hyperbaric Medicine field of specialization in Turkey. Carbon monoxide-cyanide poisoning, smoke inhalation, gas gangrene, necrotizing infections of soft tissue, crush injury, compartment syndrome, acute traumatic peripheral ischemia, delayed wound healing (diabetic-nondiabetic), chronic refractory osteomyelitis, radionecrosis (bone, intestines, soft tissue), risky skin grafts and flaps, brain abscess, anoxic encephalopathy, sudden hearing loss, sudden vision loss, acute osteomyelitis of the skull bones, sternum and vertebrae, in addition to medical or surgical treatments. Now at HBO centers in Turkey, Konya, Izmir, Antalya, Kayseri, Istanbul Bagcilar, Izmir Bozyaka and Gaziantep Dr. Ersin Arslan is in Training and Research Hospitals.

New developments in health institutions, intense competition between private and public together with city hospitals have led to an increase in service diversity by coming to the forefront in the health sector and providing some special services for patients. Health

organizations in the efficient and quality services can be offered, along with more effective use of resources in Turkey and the World economic recession has made it mandatory for. For this reason, units of the hospital with high resource consumption should take into account the cost structures of goods and services by creating a balance of revenue and expenditure. In health institutions, appropriate costing and appropriate SUT prices should be offered to prevent the institutions from harming them in return for correct costing and service.

Konya Training and Research Hospital Hyperbaric Oxygen Therapy Unit, which is the health facility where this study was carried out, was put into service on December 27, 2015, and serves 24/7 with 1 Assistant Professor Hyperbaric Specialist, 5 nurses and 2 Pressure Room Operators.

1. DEFINITION AND HISTORY OF HYPERBARIC OXYGEN THERAPY

Although HBO treatment is approached with suspicion for the last 35-40 years, it has been recommended and applied without scientific background. Hyperbaric oxygen therapy is a system that provides 100% oxygen to the patient. Oxygen therapy is applied to the patient under a pressure of 2.5 ATA at sea level. Hyperbaric oxygen therapy is a medical treatment method that is applied to patients by breathing 100% oxygen under pressure higher than normal atmospheric pressure values in closed pressure rooms. Although the treatment was not based on any scientific basis, it was first applied by increasing the pressure in a closed room that the British priest Henshaw (1662) implemented. Then by (1879) French surgeon Fotaine was the first to try this system. (Topal, Korkmaz, 2008: 28).

Hyperbaric Oxygen Therapy (HBOT) is a treatment method based on continuous or intermittent 100% oxygen inhalation at pressures higher than 1 atmospheric pressure in a closed system (Hammarlund, 2002: Chapter 3). Oxygen treatments applied at pressures equal to or lower than 1 atmosphere or locally applied to the body are not considered as HBO therapy.

1.1. In Which Diseases Is Hyperbaric Oxygen Therapy Used?

Republic of Turkey Ministry of Health regulations regarding the following diseases in the hyperbaric oxygen therapy published in the August 1, 2001, as reported in the HBOT indication. Hyperbaric. (2001, 01 August). Official Gazette (Number: 24480)

- Decompression disease (caisson disease)
- Air and gas embolism
- Carbon monoxide, cyanide poisoning, acute smoke inhalation,
- Gas gangrene
- Necrotizing infections of soft tissue (subcutaneous, muscle, fascia, fascia)
- Crush injuries, compartment syndrome and other acute traumatic ischemia
- Conditions in which wound healing is delayed (diabetic and non-diabetic)
- Chronic refractory osteomyelitis
- Excessive blood loss
- Radiation necroses
- Retention of suspicious skin flaps and grafts

● Thermal burns
● Brain abscess
● Anoxic encephalopathy
● Sudden hearing loss
● Retinal artery occlusion Konya Training and Research Hospital: (“Hyperbaric Oxygen Therapy Center,” 2019)

1.2. Application of Hyperbaric Oxygen Therapy

Hyperbaric oxygen therapy is treated by giving 100% oxygen through a mask or headgear to the patient who is fully pressurized in 2-3 ATA in pressure chambers, a closed environment prepared with new technology in health facility services. Pressure chambers have been created as a single person and a multi-person unit and are available to patients. Pressure chambers are also important devices for the treatment of profiteering divers. Generally, 2 types of hyperbaric chambers are used: A) Single-person hyperbaric chamber. B) Multi-person hyperbaric chamber. What type of treatment will be done in a hyperbaric chamber treatment is determined by the physician to see the patient's condition and appropriate. Single hyperbaric rooms are often used for the treatment of fixed patients with chronic medical problems. Multi-person hyperbaric rooms are used for the treatment of more than one person in the tube and in the treatment of critical patients who need immediate medical assistance in emergency situations (Kindwall, 2002: 22-35).

In terms of safety, the pressure of these rooms is generally increased with air and patients breathe oxygen with specially produced masks or oxygen caps (Topal and Korkmaz, 2008: 208). HBOT suitability and treatment protocols of the patients are determined by Underwater Physicians and Hyperbaric Medical Specialists. According to the list of indications determined by the Ministry of Health, the frequency of treatment lasting 2 hours per day for the patients to be treated can start from 5 sessions and increase up to 80 sessions according to the case. While the treatment session is applied once a day, in some emergency situations, it can be up to 2-3 sessions a day. During the first minutes of treatment, called "diving", patients feel the increase in pressure in their ears, just as they feel when landing on an airplane journey or descending from high mountains. Patients are told how to equalize the pressure in their ears during increased pressure. This is usually done by simply swallowing or by covering the nose and blowing air. This process is done only during the dive until it works out at the treatment pressure. HBOT can be applied to patients of all ages (Erişkon F.E.).

Patients are given special cotton clothes entered with them into the pressure chamber. Before the treatment is applied, for safety reasons, it is recommended that the patients do not use clothes that may cause static electricity, petroleum products and cosmetics during the treatment. Hyperbaric oxygen therapy patients receive, treatment is administered by experienced medical officer in hyperbaric medicine after informing the procedure for the application. During the treatment, patients are informed through a screen to be placed in the tube (Topal ve Korkmaz, 2008:208).

A HBOT sessions, although it varies according to the case, it usually takes 1.5-2 hours. Most of the patients receive one session of treatment a day. However, in some emergency situations, the number of daily sessions can be up to four. The total number of sessions varies according to the disease (Toklu, 2020).

The most common side effects of pressure change are seen in his ear and sinus effect. This situation is not dangerous, it can be prevented by learning the pressure equalization method. Other side effects are rarely and can be listed as oxygen toxicity, claustrophobia (fear of closed places to stay) and temporary myopia. During HBOT, the maximum level of oxygen dissolves in the patients' plasma and the amount of oxygen to the tissues increases. With hyperbaric oxygen therapy:

- The amount of oxygen dissolved in the plasma increases
- Provided the oxygenation of hypoxic tissue
- Reproduction of anaerobic bacteria is stopped
- Synergistic effect is provided with some antibiotics
- Edema is reduced by vasoconstriction
- Prevents cytotoxic effect in carbon monoxide and cyanide poisoning
- Leukocyte activation is strengthened in the wound area
- Provides new angiogenesis in the wound area
- It stimulates connective tissue formation in the wound area (Toklu, 2020).

2. COST ANALYSIS CONCEPT IN HEALTHCARE INSTITUTIONS

The material values of the resources that are used or estimated to be used to achieve the future targets of the business to continue their activities are defined as costs (Sevgener, Hacırüstemoğlu, 2000: 18). The determination of the goods and service units produced in the health institutions and the material value and measurement of all these transactions made to turn them into tangible assets at the end of the service and transaction is called cost analysis (Akdoğan, 2000: 5). The services produced and supplied in healthcare managements gain importance day by day. This increase in costs in healthcare managements shows how important cost analysis is. For this reason, cost analysis is an important tool for decision makers to make the necessary evaluations at the source point and to make decisions about the future of the business (Gündüz, Erdin, Gürdal, Elmacı, 2013: 3).

In order to calculate service costs in health managements, the outputs (expenses) should be examined in detail and at the same time, the outputs should be correlated with the service cost. It is necessary to determine the distribution of expenses with a good cost calculation when the total expense cost occurs. By comparing the yield of the goods and services produced with the expenses, it will help the top managers to determine the future targets of the institution (Akdoğan, 2000:351).

2.1. Payment Method of Hyperbaric Oxygen Therapy in Health Practices Statement

Hyperbaric Oxygen Therapy fees are contracted with the Institution, which has a hyperbaric oxygen treatment center, in line with the provisions of the Social Security Institution Health Implementation Notification published in the Official Gazette dated 24.03.2013 and

numbered 28597, titled "Hyperbaric Oxygen Treatment" “2.4.4.B” is covered by the Institution if it is done in the official health institution with protocol or in private centers contracted with the Institution operating within the scope of the "Regulation on Private Health Institutions Applying Hyperbaric Oxygen Therapy". In accordance with the same article, HBO treatment costs are covered by the Institution only over the prices included in the SUT annex ANNEX-2 / C List, considering the indications specified in the SUT supplement Annex-2 / D-3 List and ICD-10 diagnosis codes. The codes, scores, and prices of SUT in the Annex-2 / C List of SUT annex are shown in Table 1 (Social security institution health application notification, Hyperbaric, 2013).

Republic of Turkey Ministry of Health regulations regarding the following diseases in the hyperbaric oxygen therapy published in the August 1, 2001, as reported in the HBOT indication.

Decompression disease (caisson disease)
· Air and gas embolism
· Carbon monoxide, cyanide poisoning, acute smoke inhalation,
· Gas gangrene
· Necrotizing infections of soft tissue (subcutaneous, muscle, fascia, fascia)
· Crush injuries, compartment syndrome and other acute traumatic ischemia.
· Conditions in which wound healing is delayed (diabetic and non-diabetic)
· Chronic refractory osteomyelitis
· Excessive blood loss
· Radiation necroses
·Retention of suspicious skin flaps and grafts
· Thermal burns
· Brain abscess
· Anoxic encephalopathy
· Sudden hearing loss
· Retinal artery occlusion
· Acute osteomyelitis of the skull bones, sternum and vertebrae

(Social Security Institution Health Implementation Communique, Hyperbaric, 2013)

HBO therapy is recommended as the primary treatment for the first two indications in the diseases listed above, while it is recommended as an adjuvant therapy in other diseases. In indications where HBO therapy is applied as adjuvant therapy, it speeds up the healing process of patients and reduces mortality and morbidity. In recent studies, it has been reported that it shortens the length of hospital stay, reduces medical costs, and thus has a significant cost-effective effect (Chuck, Hailey, Jacobs, Perry DC. 2008:178-183).

The positive effects on health expenditures, which create day by day on more and more burden on the economies of the country, are evaluated in terms of cost-effectiveness. This

study analyzes the cost of a single HBO treatment center affiliated to the Ministry of Health in Konya Province was conducted.

2.2. Hyperbaric Service Transaction Points and Transaction Fees in the Social Security Institution Health Implementation Communique

As shown in the table below, Hyperbaric medicine applications in Konya Training and Research Hospital; In the Health Implementation Communique issued and priced by the Social Security Institution, SUT is included as a package transaction in Annex 2C, section 7.6. Table 1 contains SUT Codes, process name and transaction score. The transaction price is determined by multiplying the SUT score by 0.593.

Table 1. *Codes, Points and SUT prices in the List of Annex-2 / C of SUT Supplement for HBO Treatment*

SUT CODE	PROCESS NAME	TRANSACTION POINT	SUT PRICE
P702520	Recompression therapy, Type I Decompression Disease	200,17	**118,70 TRY**
P702530	Recompression therapy, Type II Decompression Disease, first session	300,17	**178,00 TRY**
P702550	Recompression therapy, Type I Decompression Disease with mixed gas	200,17	**118,70 TRY**
P702560	Recompression therapy, Type II Decompression Disease with mixed gas	300,17	**178,00 TRY**
P702570	Recompression therapy, arterial gas embolism	300,17	**178,00 TRY**
P702580	Hyperbaric oxygen therapy, 1-2 ATA sessions	69,57	**41,26 TRY**
P702590	Hyperbaric oxygen therapy, 2-3 ATA sessions	139,14	**82,51 TRY**
P702591	Hyperbaric oxygen therapy in carbon monoxide poisoning, first session	316,20	**187,51 TRY**

(Konya Training and Research Hospital Revenue Recognition Data, 2019)

2.3. Applicant Number of Patients by Years of Konya Training and Research Hospital Hyperbaric Oxygen Therapy Center

4 years from 2016 until 2019 Konya Training and Research Hospital Hyperbaric Medicine Center treated in the ambulatory outpatient and inpatient numbers are shown in Table 2. When looking to Table 2 Ambulatory Outpatient number of patients has decreased by 6.3% in 2019 compared to 2018. However, in the number of inpatients, it maintains the number of patients in 2019 compared to 2018. The number of patients in total 4.9% decrease is observed in 2019 compared to 2018. The factors considered in determining the number of patients are shown in Graphic 1.

Table 2. *Number of Ambulatory Outpatient and Inpatients for HBO Therapy*

HYPERBARIC CLINIC	2016	2017	2018	2019
Number of Ambulatory Outpatient	594	551	531	497
Number of Inpatients	209	214	180	179
TOTAL	803	765	711	676

(Konya Training and Research Hospital Revenue Recognition Data, 2019)

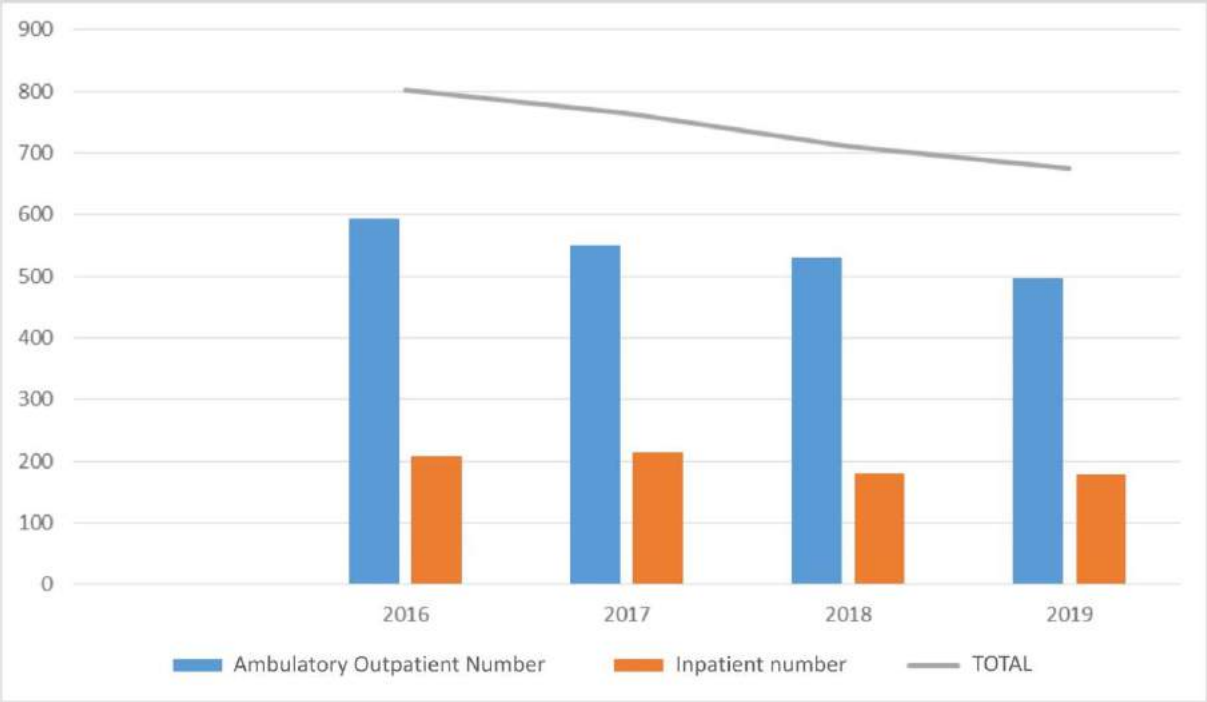


Chart 1. *Graph of the Ambulatory Outpatient and Inpatient Numbers towards HBO Therapy*

2.4. Number of Procedures Applied to Patients in Konya Training and Research Hospital Hyperbaric Oxygen Treatment Center

4 years from 2016 until 2019 Konya Training and Research Hospital Hyperbaric Oxygen Therapy Center treated in the ambulatory outpatient and inpatient to the number of transactions made are shown in Table 3. In our Hyperbaric Oxygen Treatment Center, P702590 (Hyperbaric oxygen therapy, 2-3 ATA sessions) and P702591 (Hyperbaric oxygen therapy in carbon monoxide poisoning, first session) are performed. P702590 Hyperbaric oxygen therapy, 2-3 ATA sessions; while there was a 5.64% decrease in 2019 compared to 2018, hyperbaric oxygen treatment in P702591 Carbon monoxide poisoning increased by 17.2% in 2019 compared to 2018 is followed. In total, there is a 4.95% decrease in the number of transactions in 2019 compared to 2018. The factors considered in determining the number of transactions are shown in Graphic 2.

Table 3. *The number of sessions for HBO Treatment in 2016, 2017, 2018, 2019 according to Social Security Institution Data*

SUT KODU	PROCESS NAME	2016	2017	2018	2019
P702590	Hyperbaric oxygen therapy, 2-3 ATA sessions	5.129	6.094	6.100	5.756
P702591	Hyperbaric oxygen therapy in carbon monoxide poisoning, first session	307	224	187	219
TOTAL		**5.436**	**6.318**	**6.287**	**5.975**

(Konya Training and Research Hospital Revenue Recognition Data, 2019)

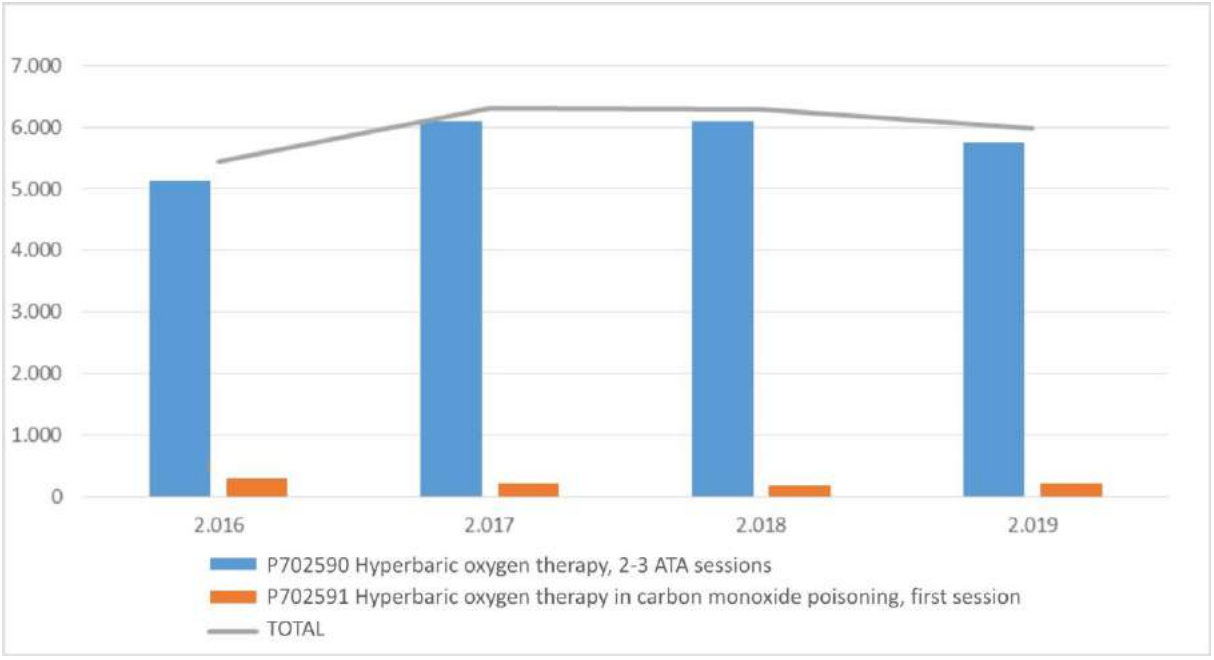


Chart 2. *Graph of the number of sessions for HBO Treatment in 2016, 2017, 2018, 2019 according to Social Security Institution Data*

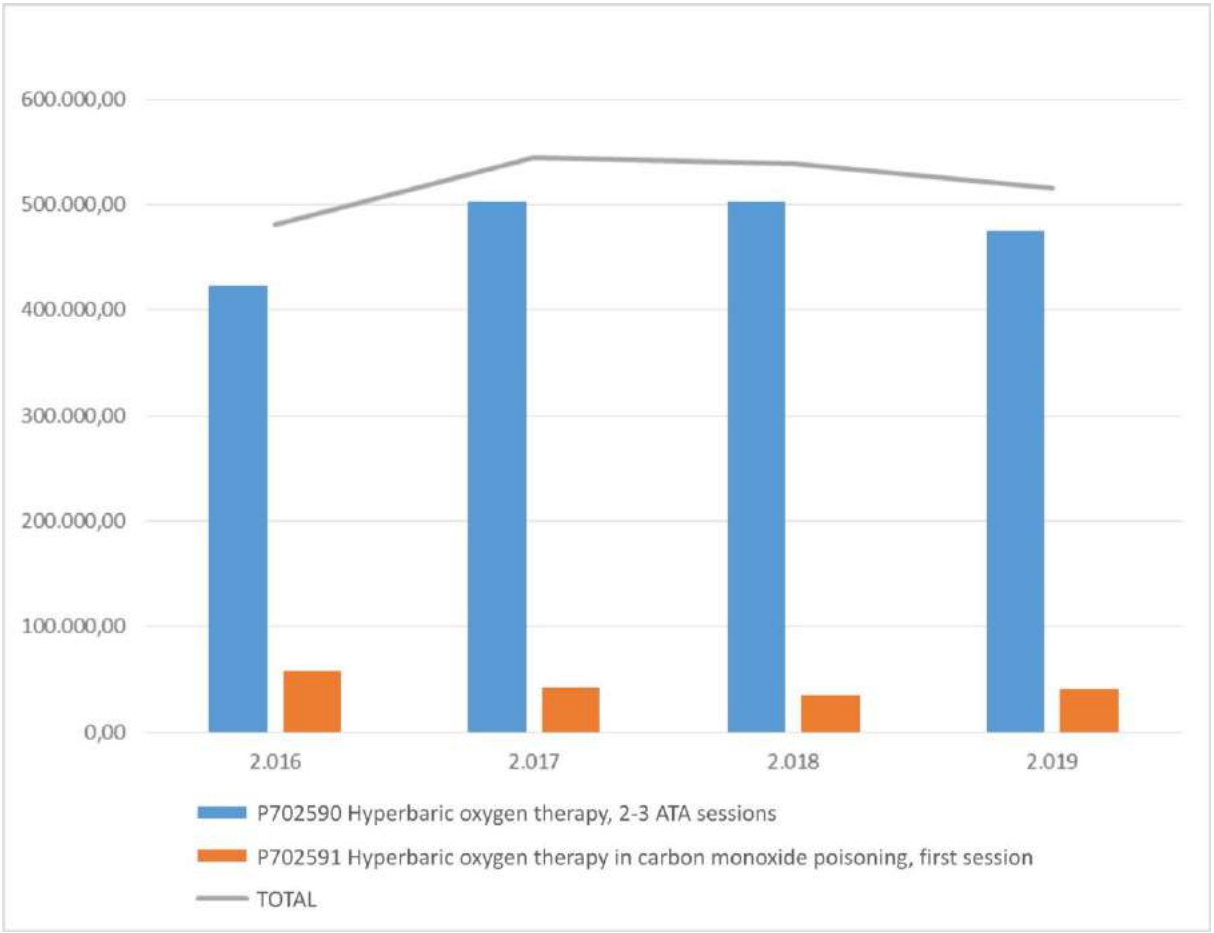
2.5. Hospital's Income Amounts of Patients Treated in Konya Training and Research Hospital Hyperbaric Oxygen Treatment Center by Years

Income totals (TRY) of the procedures performed for Ambulatory Outpatient and Inpatients treated at the Hyperbaric Medicine Center of Konya Training and Research Hospital for 4 years from 2016 to 2019 are shown in Table 4. P702590 Hyperbaric oxygen therapy, 2-3 ATA sessions; while there was a 5.64% decrease in 2019 compared to 2018 on an income basis, P702591 Hyperbaric oxygen treatment in carbon monoxide poisoning, by 17.2% increase is monitored in 2019 compared to 2018 on an income basis. In total, there is a 4.17% decrease in 2019 compared to 2018 in terms of income. The factors considered in determining the clinical revenues are shown in Graphic 3.

Table 4. *According to Social Security Institution Data, Invoice Amounts for HBO Treatment in 2016, 2017, 2018, 2019*

SUT KODU	PROCESS NAME	2016	2017	2018	2019
P702590	Hyperbaric oxygen therapy, 2-3 ATA sessions	423.193,79	502.815,94	503.311,00	474.927,56
P702591	Hyperbaric oxygen therapy in carbon monoxide poisoning, first session	57.565,57	42.002,24	35.064,37	41.064,69
TOTAL		**480.759,36**	**544.818,18**	**538.375,37**	**515.992,25**

(Konya Training and Research Hospital Revenue Recognition Data,2019)



Graph 3. *According to Social Security Institution Data, the graph of invoice amounts for HBO Treatment in 2016, 2017, 2018, 2019 years*

2.6. Amount of Expenses Obtained from Hyperbaric Oxygen Treatment in Konya Training and Research Hospital

For medical equipment expenses, the materials used in the procedures and the quantities materials were determined according to the opinion of the relevant specialist physician. The annual oxygen expense used in the process was divided by the annual session duration and the

hourly oxygen expense was found. Oxygen cost per session was calculated by multiplying the average duration of 1 session by the hourly oxygen expense. Since the materials such as masks, hoses, headgear, and clothes used in the procedure are not disposable, they are sterilized for each patient and it is not known how much is consumed during the year, these expenses have been ignored in the cost calculation.

For labor costs, specialist physicians, nurses and all other staff members in the process team are determined. In the labor calculations, the gross salary, additional payment, and revolving fund amounts received by each employee in one month were provided from the trusteeship unit. If the time spent by each designated employee for the procedure is 22 days per month and 8 hours per day, the total monthly working time is converted into hours. Total monthly workmanship per month divided by this time hourly workmanship were determined. The annual total working time of the hyperbaric chamber for the operations was multiplied by the hourly workmanship, and the annual workmanship for the operations was found. The annual labor costs were divided by the number of annual sessions of the transactions, and the labor cost per session was reached.

In the calculation of depreciation charge, (BAROX MUI34 Brand device), especially in the hyperbaric oxygen treatment application performed in the pressure chamber equipped with new technology, the total installation cost of the pressure chamber including VAT (value added tax) is divided by the economic life of the device (10 years) and the annual depreciation charge has been found.

In the calculation of device maintenance expense, the annual service maintenance fee contract made by our hospital was taken as a basis. In addition, the 4/1 amount of the device revision operations, which were carried out every 4 years and last in 2019, were added to the expense.

Since many electrical devices are included in the equipment of the pressure chamber, the electricity cost has been calculated separately. In the electricity cost calculation, all electrical appliances used for the process and the hourly electricity consumption (kw) of these electrical appliances were found. The cost of 1 Kw electricity has been found by dividing the monthly electricity consumption price specified in the electricity bill obtained from the hospital by the total monthly consumption amount. The annual electricity consumption was calculated by multiplying the hourly electricity consumption of the devices by the annual operating time of the operations. The annual electricity cost of the operations was found by multiplying the 1Kw electricity price with the annual electricity consumption of the operations. The electricity cost per session was found by dividing the annual electricity cost of the transactions by the total number of sessions per year. The device depreciation and maintenance costs for the transaction are directly affected by the number of annual sessions, and the increase in the number of sessions will reduce the depreciation and maintenance costs per session. Natural Gas and Water costs the unit price was determined by dividing our hospital by the indoor area, and the expense was found by multiplying it by the area of the Hyperbaric Medical Center. Medicine, Radiology, Laboratory, Belongings and Medical disbursement expenses of the

Hyperbaric Medical Center were taken from the hospital's Hospital Information Management System automation system.

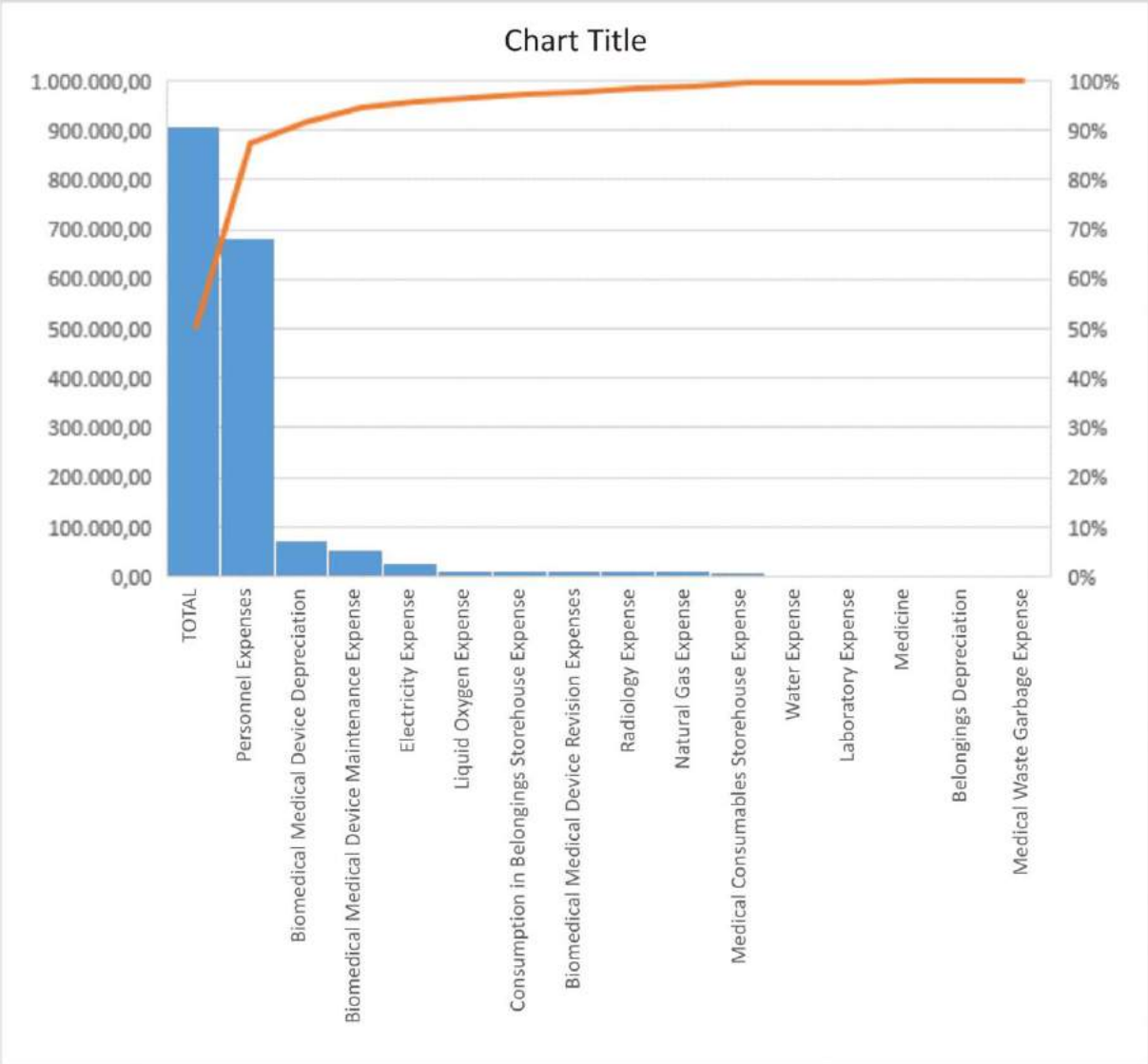
In the calculation of Manufacturing Overhead, the total expenditures for the year 2019 were calculated based on the M1-Institution's Detailed Budget and Realization Table, which shows the details of the expenses arising from the Revolving Fund through the Uniform Accounting System for the Konya Training and Research Hospital, where the study was conducted. In the study, expense items that are considered as direct cost factors for transactions, such as medical equipment and process teams described above, which are considered as direct material and labor expenses are excluded. Hyperbaric oxygen treatment is inherent to the process line, for depreciation, maintenance and electricity costs calculated separately, are ignored in calculating the overall production costs. Security, public relations, general cleanliness, staff meals, water, gas, communications, transportation, and so the total amount of general expenses that qualify as production expenses are determined.

Due to medical and hazardous wastes are weighed and received from the units, Kg x Unit price is calculated and processed into the expense. The factors considered in determining the clinical expenses are shown in Graphic 4.

Table 5. *According to Konya Training and Research Hospital Data, Expenses for HBO Treatment in 2019*

Expense (Year 2019)	**SUM**
Personnel Expenses	682.310,72
Medical Consumables Storehouse Expense	9.005,94
Consumption in Belongings Storehouse Expense	11.525,21
Medicine	2.225,37
Radiology Expense	11.215,00
Laboratory Expense	2.368,00
Natural Gas Expense	11.143,80
Electricity Expense	25.481,52
Water Expense	2.432,61
Liquid Oxygen Expense	11.832,48
Medical Waste Garbage Expense	17,00
Biomedical Medical Device Depreciation (Barox Mui34 Brand)	72.975,74
Biomedical Medical Device Maintenance Expense (Barox Mui34 Brand)	53.100,00
Biomedical Medical Device Revision Expenses (To Be Done Every 4 Years 4/1 İ)	11.505,00
Belongings Depreciation	2.082,66
TOTAL	**909.221,05**

(Konya Training and Research Hospital Revenue Recognition Data,2019)



Graphic 4. *According to Konya Training and Research Hospital Data, 2019 Expense Amounts Chart for HBO Treatment*

2.6.1. Hyperbaric Oxygen Therapy Center in Calculation Method Based on Transaction Cost

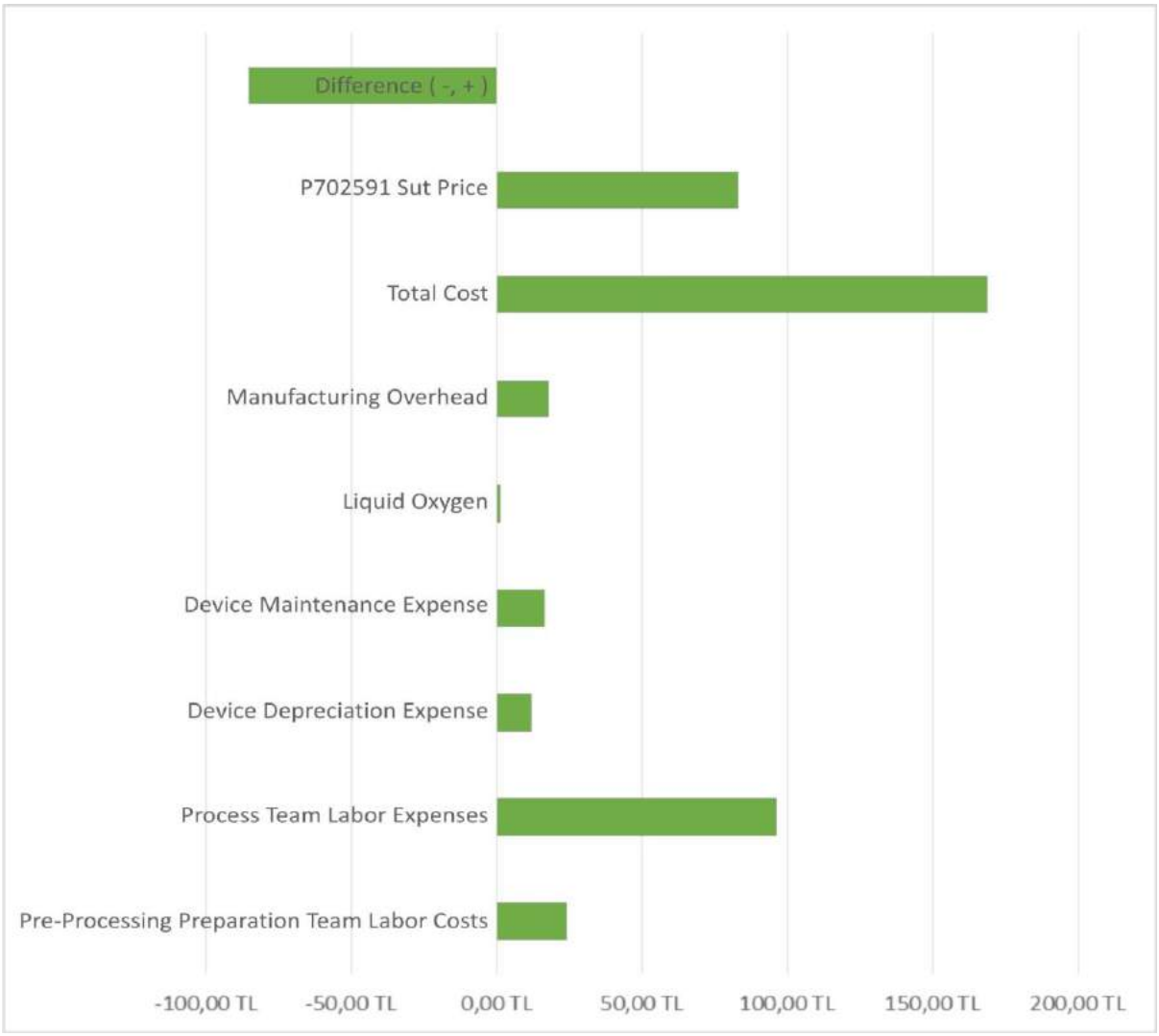
1.1. The transaction score of P702590 "Hyperbaric oxygen therapy, 2-3 ATA sessions" included in the 2013 SUT annex ANNEX-2 / C list is 139.14, and the transaction cost is 82.51 TRY when multiplied by the coefficient (0.593).

1.2. As a result of the study conducted in Konya Training and Research Hospital, as seen in Table 6, the cost of the "Hyperbaric oxygen therapy, 2-3 ATA sessions" was determined as 168.84 TL with the most optimistic fiction, and the difference between the transaction price in SUT is minus 85,32 TRY.

Table 6. *P702591 Financial analysis table of hyperbaric oxygen therapy 2-3 ATA sessions*

AFFECTING THE COST FACTORS	SUM
Pre-Processing Preparation Team Labor Costs	24,40 TRY
Process Team Labor Expenses	96,39 TRY
Device Depreciation Expense	12,21 TRY
Device Maintenance Expense	16,58 TRY
Liquid Oxygen	1,24 TRY
Manufacturing Overhead	18,02 TRY
TOTAL COST	**168,84 TRY**
P702591SUT PRICE	83,52 TRY
DIFFERENCE (-, +)	**-85,32 TRY**

(Konya Training and Research Hospital Revenue Recognition Data,2019)



Graph 5. *P702591 Financial analysis chart graph of hyperbaric oxygen therapy 2-3 ATA sessions*

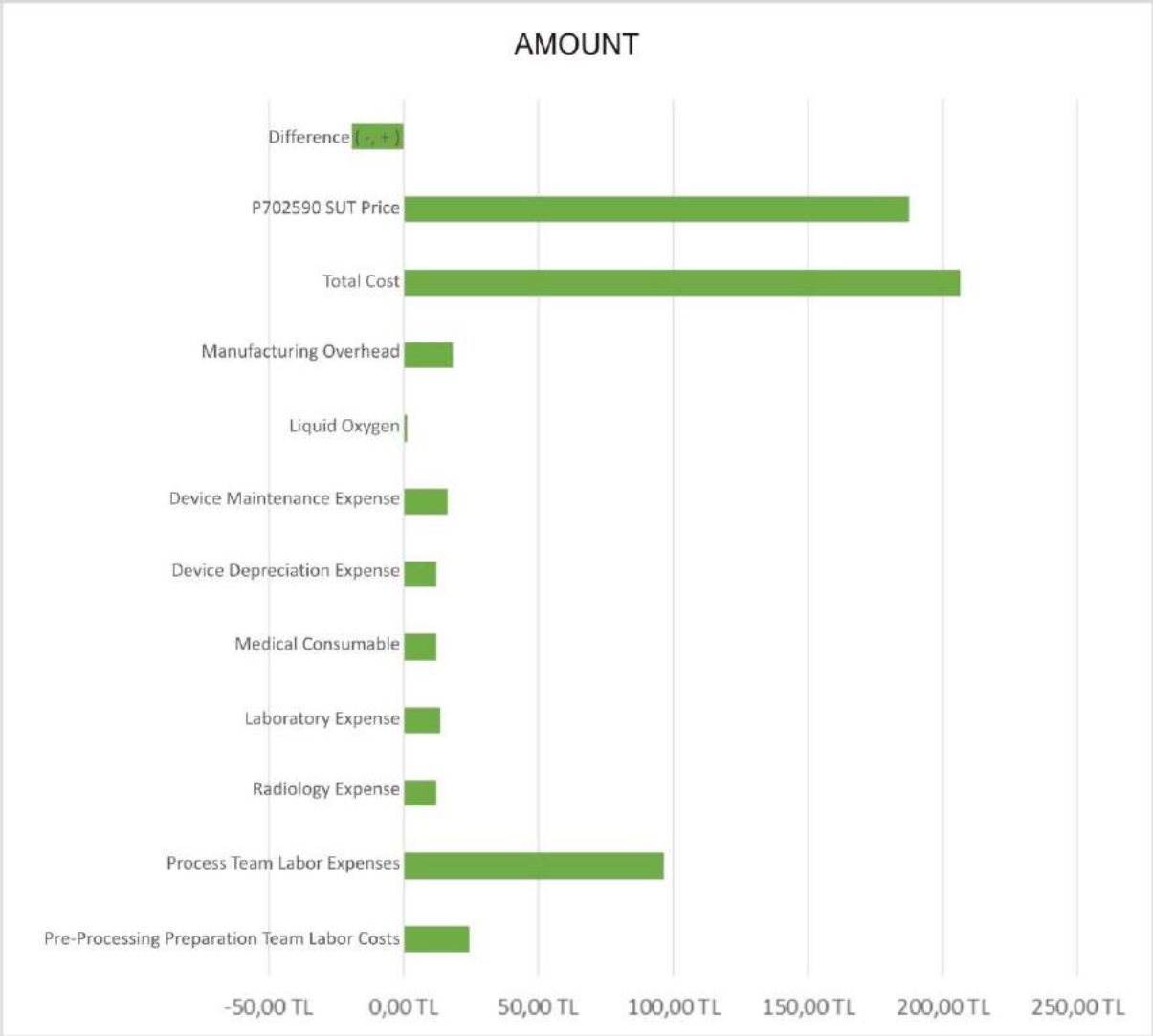
2.1. The transaction score of P702591 "Hyperbaric oxygen treatment in carbon monoxide poisoning, first session", which is included in the 2013 SUT annex ANNEX-2 / C list, is 316.20, and the transaction cost is 187.50 TRY when multiplied by the coefficient (0.593).

2.2. As a result of the study conducted in Konya Training and Research Hospital, the cost of the "hyperbaric oxygen treatment in carbon monoxide poisoning" procedure was determined as 206.30 TRY with the most optimistic fiction, and the difference between the transaction price in SUT is minus 18.79 TRY. The factors considered in determining the transaction price are shown in Graphic 10.

Table 7. *Financial analysis table of Hyperbaric oxygen therapy session in P702590 Carbon Dioxide poisoning*

AFFECTING THE COST FACTORS	SUM
Pre-Processing Preparation Team Labor Costs	24,40 TRY
Process Team Labor Expenses	96,39 TRY
Radiology Expense	12,16 TRY
Laboratory Expense	13,40 TRY
Medical Consumable	11,90 TRY
Device Depreciation Expense	12,21 TRY
Device Maintenance Expense	16,58 TRY
Liquid Oxygen	1,24 TRY
Manufacturing Overhead	18,02 TRY
TOTAL COST	**206,30 TRY**
P702591SUT PRICE	187,51 TRY
DIFFERENCE (-, +)	**-18,79 TRY**

(Konya Training and Research Hospital Revenue Recognition Data,2019)



Graph 6. *Financial analysis chart graph of Hyperbaric oxygen therapy session in P702590 Carbon dioxide poisoning*

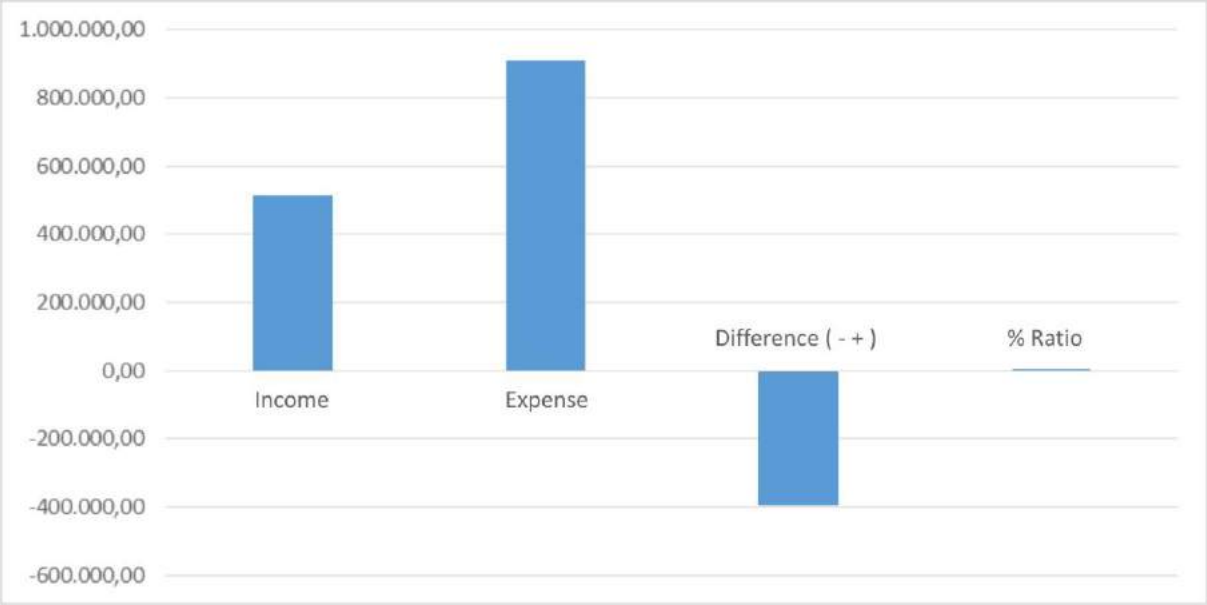
2.7. Income-Expense Balance Comparison According to Konya Training and Research Hospital Hyperbaric Oxygen Treatment Center Cost Analysis

Income-Expense analysis made in Konya Training and Research Hospital Hyperbaric Medicine Center's total revenues in 2019 to 515,992.25 TRY, the sum of expenses is 909,221.05 TRY, 323,228.80 TRY negative difference is made. Income ratio, Expense ratio difference - 43.25%. The cause of this negative difference in 2013, the Social Security Institution in the SUT application communique issued at the price of hyperbaric operations there is no increase to this day, remains constant prices, the occurrence of the next price increases over the years in all the costs it has led to negative price difference. Especially personnel expenses constitute 65% of all income.

Table 8. *According to Konya Training and Research Hospital Data, 2019 Income-Expense Amounts, Difference and Ratio for HBO Treatment*

INCOME	EXPENSE	DIFFERENCE(- +)	% RATIO
515.992,25	**909.221,05**	**-393.228,80**	**-43,25%**

(Konya Training and Research Hospital Revenue Recognition Data,2019)



Graphic 7. *According to Konya Training and Research Hospital Data, 2019 Income-Expense Amounts, Differences and Rates Graph for HBO Treatment*

CONCLUSION

Hyperbaric Oxygen Therapy is a treatment method applied by continuously or intermittently inhaling 100% oxygen at pressures higher than 1 atmospheric pressure in a closed system. To apply this treatment, specialized equipment and trained team personnel are required. In this study, it was aimed to evaluate the cost analysis of the only Hyperbaric Oxygen Treatment Center within Konya Training Research Hospital and serving in Konya Province.

Material Method: In this study, one-year bills invoiced to SUT by the HBO Treatment Center in 2019 and the expenses of personnel working in the treatment center, device maintenance and depreciation expenses, consumables used in the clinic, electricity, natural gas costs were compared. Cost analysis between income and expenses has been evaluated.

Results: While HBOT clinic's annual earnings were calculated as 515.992.25 TRY, the total expenses were calculated as 909.221.05 TRY. As a result of the study, it was seen that it could earn only 56.75% of the incomes according to the clinical expenses.

Discussion: Being a center with a single doctor and 3 nurses providing continuous service on a 24/7 sake procedure basis, with a minimum number of personnel and even though this service is provided, the amount paid by SUT in the treatment services of the department, which has a large difference in income-expenditure rates, it was determined that it should be

206 TL. Since 2 or more doctors are required to serve in this clinic, which normally works on demand, new calculations will be required as the calculated expense base will increase depending on the increase in the number of personnel.

REFERENCES

Akdogan, Nalan (2000), "Cost Accounting Practices in the Uniform Cost Accounting System", Gazi Bookstore, 5th Edition, Ankara.

Chuck AW, Hailey D, Jacobs P, Perry DC. Cost-effectiveness and budget impact of adjunctive hyperbaric oxygen therapy for diabetic foot ulcers. Int J Technol Assess Health Care. 2008;24(2):178-183. doi:10.1017/S0266462308080252

Eriskon F.E. You have a high chance of getting rid of diabetic foot wounds with hyperbaric oxygen therapy. Access Address: https://hisarhospital.com/diabetic-foot-wounds-hyperbaric-oxygen-therapy-with-get rid of-chance-high/

Gündüz, H. Erdin; Kadir Gürdal and Orhan Elmacı (2013) "Cost Analysis", (Ed: H. Erdin Gündüz), Anadolu University Publication No: 3033, 1st Edition, Eskişehir.

Hammarlund C. (2002): Chapter 3, The Physiologic Effects of Hyperbaric Oxygenation. In Kindwall E.P. and Whelan H.T. (Eds): Hyperbaric Medicine Practice 2nd Revised Edition, USA, Best Publishing Company, 37-68

Hammarlund C. (2002): Chapter 3, The Physiologic Effects of Hyperbaric Oxygenation. In Kindwall E.P. and Whelan H.T. (Eds): Hyperbaric Medicine Practice 2nd Revised Edition, USA, Best Publishing Company, 208

Kindwall EP. Thephysics of divivg and hyperbaric pressures in: Kindwall Ep, Whelan HT, eds, hyperbaric medicine practice, 2 ed Flasgstaff: Best Publishing Company:2002. p.22-35

Konya Training and Research Hospital Hyperbaric Oxygen Treatment Center. (2019, 01 August) Access address https://konyaeah.saglik.gov.tr/TR,278796/hyperbaric-oxygen-therapy-center.html

Regulation on Private Health Institutions Providing Hyperbaric Oxygen Therapy (2001). Republic of Turkey Official Gazette (24480 08. January 2001)

Sevgener, A. Sait, Rüstem Hacırüstemoğlu (2000), Management Accounting Practices. Alfa publishing, Istanbul.

Social Security Institution Health Implementation Communique (2013) T.C. Official Gazette, (28597, 24 March 2013)

Toklu, What is hyperbaric oxygen therapy?. Access address http://www.tkbbv.org.tr/menu/82/hyperbaric-oxygen-therapy-hbot-what-prof-dr-akin-savas-toklu

Topal, A. Turgut. Ahmet Korkmaz, Turkey Clinics J Med Sci 2008; 28

ÖNEMLİ NOT: Bu çalışma tamamlanmamış olarak hazırlık aşamasında iken, 29.12.2020 de III. İnternational Conference on COVİD-19 Studies (ISBN: 978-605-70216-1-8) de SADECE özet metin yayınlanmıştır. Çalışma verilerin tamamlanması ve analizlerin bitmesi ile birlikte tam metin haline getirilip tamamlanarak kongrenizde sunulmuştur.