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Research

The Retrospective Analysis of Interventional Procedures Performed in the Emergency Department Between 2017-2021: Türkiye Sample

2017-2021 Tarihleri Arasında Acil Serviste Yapılan Girişimsel İşlemlerin Retrospektif Analizi: Türkiye Örneklemi

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ABSTRACT

Objective: Many interventional procedures for diagnosis and treatment were being performed in the emergency departments. We examined interventional procedures, some of which we consider critical and some that we apply very frequently in emergency departments. We analyzed the correlation of interventions such as endotracheal intubation, central venous catheterization, tube thoracostomy, nasogastric tube placement, bladder catheterization, incision repairs applied in emergency departments with the admissions to the emergency departments, the quantitative changes over the years, and the effect of the pandemic process on both emergency admissions and these interventions.

Methods: In this study, which was planned as a retrospective descriptive study, the data of the patients who admitted to the emergency departments of the 2nd and 3rd level public hospitals in Türkiye, between March 2017 and March 2021 have been discussed. The annual mean value of the data between the 1-year pandemic period March 11, 2020 when the pandemic started in our country until March 11, 2021, and the data between March 11, 2017 and March 11, 2020, in the pre-pandemic period, were examined and these periods were compared. The data were recorded on the spreadsheet program and their percentage changes were calculated using the statistical formulas of the spreadsheet program.

Results: Between 2017 and 2020, there was a continuous increase in the emergency service examinations of 2nd and 3rd level public hospitals, and the number of examinations decreased to 93.5 million patients with the coronavirus disease-2019 (COVID-19) pandemic. The number of endotracheal intubations increased by 11.6% during the pandemic period. The number of central venous catheters applied during the pandemic period decreased by 16.2% compared with the 3-year average before the pandemic. Tube thoracostomy decreased by 0.13%, bladder catheter application by 3.2%, nasogastric tube application and incision repair decreased by 26.6% during the pandemic period.

Conclusion: In the first 1-year period of the COVID-19 pandemic, the average emergency service applications, incision repair, nasogastric tube application, bladder catheterization, tube thoracostomy and central venous catheterization applications decreased during the pandemic period compared to the 3-year period before the pandemic.

Keywords: Emergency medicine, endotracheal entubation, pandemic

ÖZ

Amaç: Acil servisler hayati önem arz eden tanıların konulduğu, tetkik ve tedavilerinin yapıldığı alanlar olmuştur. Acil servislerde tanı ve tedavi amaçlı birçok girişimsel işlem yapılmaktadır. Acil servislerde bir kısmını çok önemli gördüğümüz bir kısmını da çok sık uyguladığımız girişimsel işlemleri inceledik. Acil servislerde uygulanan endotrakeal entübasyon, santral venöz kateterizasyon, tüp torakostomi, nazogastrik tüp takılması, mesane sonda uygulamaları, kesi onarımları gibi girişimlerin acil servislere olan başvurularla korelasyonunu, yıllar içerisindeki niceliksel değişimlerini, pandemi sürecinin gerek acil başvurularına gerekse bu müdahalelere etkisini inceledik.

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Gereç ve Yöntem: Retrospektif tanımlayıcı planlanan bu çalışmada, Mart 2017-Mart 2021 tarihleri arasında Türkiye'de 2. ve 3. basamak kamu hastaneleri acil servislerine başvuran hastalara ait veriler ele alınmıştır. Ülkemizde pandeminin başladığı 11 Mart 2020 ile 11 Mart 2021 yılları arasındaki 1 yıllık pandemi süreci ile pandemi öncesi dönemdeki 11 Mart 2017-11 Mart 2020 yılları arasındaki verilerin yıllık ortalaması incelenmiş ve bu dönemler karşılaştırılmıştır. Veriler tablolama programı üzerine kaydedilmiş ve yüzdesel değişimleri tablolama programı istatistiksel formülleri üzerinden hesaplanmıştır.

Bulgular: 2017-2020 yılları arasında 2. ve 3. basamak kamu hastaneleri acil servis muayenelerinde sürekli artış görülmüş olup koronavirüs hastalığı-2019 (COVİD-19) pandemisiyle birlikte muayene sayıları 93,5 milyon hastaya düşmüştür. Endotrakeal entübasyon sayıları pandemi döneminde %11,6 oranında artmıştır. Pandemi sürecinde uygulanan santral venöz kateter sayıları pandemi öncesi 3 yıllık ortalamaya göre %16,2 oranında azalmıştır. Diğer uygulamalara baktığımızda tüp torakostomi %0,13 oranında, mesane sonda uygulaması %3,2 oranında, nazogastrik sonda uygulaması ve kesi onarımı %26,6 oranlarında pandemi döneminde azalmıştır.

Sonuç: COVİD-19 pandemisinin görüldüğü ilk 1 yıllık süreçte pandemi öncesi 3 yıllık döneme göre ortalama acil servis başvuruları, kesi onarımı, nazogastrik tüp uygulama, mesane sonda uygulaması, tüp torakostomi ve santral venöz kateterizasyon uygulamaları pandemi sürecinde azalmıştır. Pandemi döneminde, pandemi öncesi 3 yıllık sürece göre ortalama girişimsel işlem sayısı artan tek işlem endotrakeal entübasyon olmuştur.

Anahtar Kelimeler: Acil servis, endotrakeal entübasyon, pandemi

INTRODUCTION

In December 2019, a new coronavirus, the cause of which could not be found, was detected in the respiratory secretions of patients who had been admitted to hospitals with symptoms of lower respiratory tract infection in China. The World Health Organization (WHO) named this virus severe acute respiratory syndrome coronavirus-2 and the emerging infection was named as coronavirus disease-2019 (COVID-19) infection. As of March 11, 2020, WHO has declared a pandemic in the world (1).

Both during and before the pandemic, the most frequently admitted unit in the health facilities of our country was the emergency departments. The emergency departments have were areas where vital diagnoses were made, examinations and treatments were carried out. Many interventional procedures for diagnosis and treatment were being performed in the emergency departments.

We examined interventional procedures, some of which we consider critical and some that we apply very frequently in emergency departments. We analyzed the correlation of interventions such as endotracheal intubation, central venous catheterization (CVC), tube thoracostomy (TT), nasogastric tube (NGT) placement, bladder catheterization, incision repairs applied in emergency departments with the admissions to the emergency departments, the quantitative changes over the years, and the effect of the pandemic process on both emergency admissions and these interventions.

Our aim in the study is primarily to show the most frequently performed interventional procedures in emergency services, their changes according to years and their relationship with emergency room visits with current data.

METHODS

In this study, which was planned as a retrospective descriptive study, the data of the patients who were admitted to the emergency departments of the 2nd and 3rd level public hospitals in Türkiye, between March 2017 and March 2021 have been discussed. The annual mean value of the data between the 1-year pandemic period March 11, 2020 when the pandemic started in our country until March 11, 2021, and the data between March 11, 2017 and March 11, 2020, in the pre-pandemic period, were examined and these periods were compared.

The data were analyzed by obtaining the necessary permissions from the Ministry of Health. The study was initiated after obtaining the approval number E2-22-1620 of the Ankara City Hospital Clinical Research Ethics Committee (date: 30.03.2022). Our study was conducted in accordance with the ethical standards of the 1964 Declaration of Helsinki and its subsequent amendments.

Statistical Analysis

The data were recorded on the spreadsheet program and their percentage changes were calculated using the statistical formulas of the spreadsheet program.

RESULTS

When the emergency department admissions of the 2nd and 3rd level public health facilities between 2017 and 2020 were analyzed; we had determined that 107.4 million patients in 2017, 117.9 million patients in 2018 and 129.7 million patients in 2019 were examined in emergency departments. In 2020, there was an increase in emergency department patient admissions due to the COVID-19 pandemic and the number of examinations had decreased to 93.5 million patients (Figure 1). In the 3-year period before the pandemic, it was observed that there were a mean 118.4 million admissions per year and an annual increase of 9.6% were detected. During the 1-year pandemic period between 2020 and 2021, it was observed that the number of admissions decreased by 27.6% compared to the mean number of patients in the pre-pandemic period and the number of admissions decreased to 93.5 million.

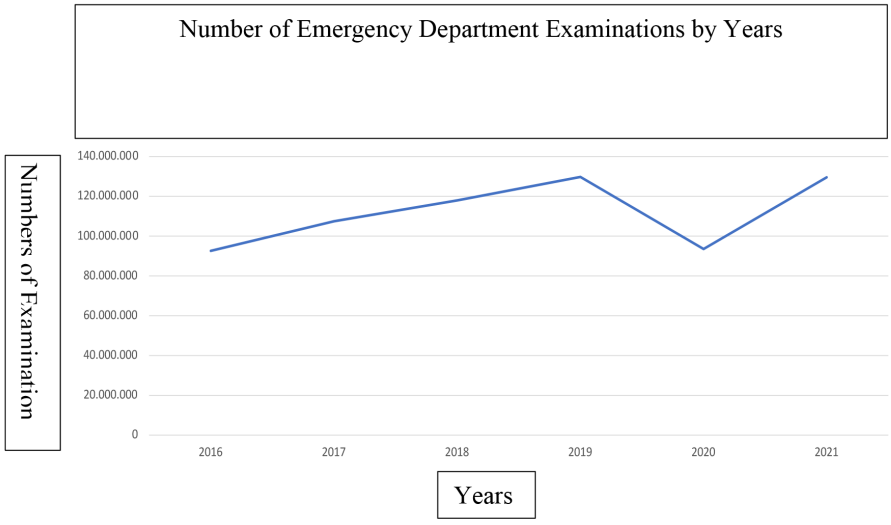

Figure 1. Number of emergency department examinations by years

When we considered the number of endotracheal intubations performed in the emergency department, it was seen that mean 86,447 endotracheal intubations were performed annually in the pre-pandemic period between 2017 and 2020, which corresponded to an annual increase of 9.7%. In the 1-year pandemic period between 2020 and 2021, an increase of 11.6% was determined compared with the mean endotracheal intubation in the 3-year period before the pandemic (Table 1).

When we considered the number of CVC inserted in the emergency department, it was seen that the annual mean value was 24,149 between 2017 and 2020 before the pandemic. It has been detected that the annual increasement ratio of these years corresponded to 18.5%. In 2020, it was determined that the number of insertions decreased to 20,225 and this decreasement was 16.2% compared with the mean value in the pre-pandemic period. In the pre-pandemic and pandemic periods, CVC insertions have changed proportionally with the emergency service admissions in these periods. When we considered the most frequently preferred veins for CVCs in our study, we had seen that the jugular vein was preferred most frequently with an annual mean of 11,124, which was followed by the femoral vein with an annual number of 11,041,5. The subclavian vein was preferred as the least with an annual number of 1,002,5 (Table 2).

When we examined the TT levels applied in the emergency department, it was seen that mean 7,212 chest tubes were inserted between 2017 and 2020, and it was determined that there was an annual increase of 3.2% in the pre-pandemic period. In 2020, it was determined that there was no significant change with the pandemic, and there was only a 0.13% decreasement in the 1-year period. We observed that the most frequently performed interventional procedure in the emergency department was incision repair. In the 3-year period before the pandemic, the annual mean number of incision repairs was 1,766,329, which has been determined as 1.52% among all emergency admissions (Table 1).

In the first 1-year period during the pandemic process, it was determined that incision repair decreased to 1,295,397 and the ratio among total emergency admissions was 1.38%. The annual increase ratio of the patients admitted for incision repair between 2017 and 2020 was determined as 8.5%. Since the 2020 pandemic, there was a significant decreasement in admissions and it decreased by 26.6% compared to the mean value of the pre-pandemic period. In the emergency department following incision repair, the most frequently performed interventional procedure was bladder catheterization. In the pre-pandemic period between 2017 and 2020, a mean urinary catheter was inserted into the bladder 805,686 times per year. During this process, a continuous increase was observed every year and the annual increase ratio was mean 11.5%. In 2020, 779,749 catheters were inserted and a decline of 3.2% was detected compared to the pre-pandemic mean value.

Another invasive procedure that has been frequently performed in the emergency department was the NGT placement. The mean number of NGT placements per year in the pre-pandemic period was detected as 269,770. This result corresponded to approximately 0.2% of emergency admissions. Although the number, which was 244,362 in 2017 during the pre-pandemic period, decreased in 2019, 4.9% annual mean increasement was observed in this 3-year period. In the first year of the pandemic, this number

Table 1. The number of emergency service admissions and interventional procedures over years

Column 1	2017	2018	2019	2020
The name of the process	The number of the process	The number of the process	The number of the process	The number of the process
Emergency department admission	107,491,580	117,982,971	129,764,460	93,567,880
Endotracheal intubation	75,520	86,113	97,708	96,529
Central vein catheterization	19,980	21,391	31,078	20,225
Tube thoracostomy	7,043	7,099	7,494	7,188
Incision repair	1,587,912	1,717,242	1,993,833	1,295,397
Bladder catheter insertion	715,597	824,634	875,938	779,749
Nasogastric tube placement	244,362	296,240	268,708	197,835

Table 2. The number of central venous catheters inserted in the emergency department by years

Column 1	2017	2018	2019	2020
The name of the process	The number of the process	The number of the process	The number of the process	The number of the process
Jugular vein catheterization	8,068	11,181	16,032	9,217
Femoral vein catheterization	10,861	9,204	13,939	10,162
Subclavian vein catheterization	1,051	1,006	1,107	846
Total	19,980	21,391	31,078	20,225

decreased to 197,835, and the ratio of decreasement was 26.6% compared to the number of NGTs that had been placed before the pandemic (Table 1).

DISCUSSION

When the data of the last four years were examined, emergency service admissions have increased continuously until 2020, when the COVID-19 pandemic had started and peaked, with an annual mean of 9.6%. The mean levels of all interventional procedures performed were on the rise in the pre-pandemic period. In 2020, with the effect of the COVID-19 pandemic, all interventional procedures along with the number of patients had received their share from the pandemic and had showed a significant decreasement.

Endotracheal intubation is a life saving procedure that is been commonly performed in the emergency room, intensive care unit, interventional radiology applications, pre-hospital patient transportation, or for critical patients in the hospital wards (2).

Airway management skill is one of the maximum important aids among all of the treatment methods and tools of the emergency physician at the time of emergency intervention requirement for the patient. The main purpose of airway management is to provide oxygenation and ventilation for the patients. The maintenance of ventilation and oxygenation for the patient can be done with a simple maneuver such as repositioning the patient's head, or it can be achieved with a complicated technique that requires opening a surgical airway to the patient (3).

In our study, we have determined that the rates of endotracheal intubation in emergency departments had increased continuously in correlation with the increase in admissions to the emergency department in the pre-pandemic period. Despite the 27.6% decreasement in admissions to the emergency department during the 2020 pandemic period, there was no significant increase in endotracheal intubation levels, and it increased by approximately 11.6% compared to the mean value of the last 3 years. It has been considered that the increase before the pandemic was due to excess patient population, and the high rates during the pandemic period were due to the high number of patients with respiratory failure secondary to COVID-19 pneumonia.

CVC is a commonly used method in patients undergoing both surgical and medical treatment. CVC; enables many procedures done such as haemodynamic monitoring, intravenous drug therapy, plasmapheresis, hemodialysis, and total parenteral nutrition in patients who present with cardiac arrest, in need of massive fluid

replacement, and in patients with no peripheral venous access (4).

In accordance with the increase in the number of emergency medicine specialists in our country, the CVC procedure has become a more feasible procedure in emergency departments. It is vital to provide an efficient and rapid intravenous route, particularly in unstable patients who are admitted to the emergency department. The CVC procedure can be performed accurately and rapidly and those complications can must be intervened once they occur (5).

In a study conducted in our country, it was determined that the most common cause of CVC insertion was hemodialysis (54%), and trauma had a ratio of only 5.6%. In terms of frequency sequence internal jugular vein, femoral vein, and subclavian veins were preferred in patients (5).

Similarly, in our study, the jugular vein was most frequently preferred, which was followed by the femoral vein and then the subclavian vein (Table 2). In the general overview of all CVC procedures by years, it has been determined that there was a decreasement when the previous years were compared with the period in which the cause of admission was COVID-19 infection. This reduction was considered the patients with COVID-19 infection were hospitalized or discharged before the need for CVC insertion.

NGT placement has been performed in thousands of patients who were being treated in the hospital every year for diagnostic, preventive, or therapeutic purposes as a complementary to medical and surgical procedures (6).

NGT placement has often been used for upper gastrointestinal bleeding, gastric emptying and lavage after suicidal and accidental intoxication, gastric outlet obstructions, intestinal obstructions, feeding the patients with difficult oral intake, to prevent gastric distension in some patients, to testing gastric contents, before surgery and after surgery for decompression (7). The use of NGT is increasing in hospitals and at homes due to the increase in the number of elderly patients and chronic diseases (8). Although there was no continuous increasement or decreasement before the COVID-19 period, there was an increase in total NGT placement. Along with the COVID-19 pandemic, a very significant decreasement in practice has been detected. It has been considered that this decreasement was related to the increase in the admissions of patients with chronic diseases and intoxication to the emergency departments.

Bladder catheter application; is the procedure of placing a catheter from the urethra to the bladder for diagnosis or treatment, which is required for many reasons such as urine output monitoring for critically ill patients, removal of urinary obstruction, surgical operations and palliative support.

This procedure increases the examination and follow-up possibility of clinicians and allied health personnel, and in some cases, it can increase the quality of life of the patient (9). Thus, it is one of a procedures that is widely performed in emergency departments and for the treatment and care of inpatients. In our study, it was determined that there were more bladder catheter applications than the increase in emergency service admissions in the pre-COVID-19 period, and there was an increase in the number of applications with the pandemic. When we consider the reasons for the cessation of elective surgical operations during the pandemic period, the decrease in hospitalizations other than COVID-19 infected patients, the application of catheters for palliative support with the help of units such as home care services other than the emergency department can be counted.

TT is one of the important surgical procedures frequently performed in emergency departments. This procedure can be applied to the patient in the operating room and at the bedside. The procedure is generally performed by thoracic surgeons, emergency medicine specialists and their assistants, interventional radiologists and intensive care specialists. There were many indications for TT. In the emergency department, the procedure was mostly performed due to spontaneous pneumothorax, traumatic pneumothorax and hemothorax (10).

The thoracic tube provides an evacuation of air or fluid (blood, lymph, pus and other) in the pleural cavity and expansion of the lungs (11,12).

Although TT is the most common surgical intervention performed by thoracic surgeons, it is a life-saving procedure especially in cases such as tension pneumothorax and massive pleural effusion. Therefore, emergency medicine specialists should accurately determine TT indications and perform TT techniques appropriately (11,12). In our study, when we consider TT procedures by years, a continuous increase was seen in the pre-COVID-19 period and although not at serious rates compared to the previous year, a slight increase was seen with the pandemic process. This may be once more due to the increase in accident and trauma cases, with lockdown restrictions.

Additionally, in this process, patients pleural fluid secondary to pneumonia or for any other reason and who needed pleurocan or TT were unkept waiting for a long time in the emergency departments and their procedures

were performed directly in the services or intensive care units.

Another group of procedures in the emergency department is incision repair. Incision repair is an important and urgent interventional treatment procedure applied to the patients with injuries.

The types of injuries of the patients who admitted to the emergency department can be seen in a wide range, from soft tissue injuries and simple cuts to complicated cuts (tendon, nerve injury) (13,14).

In different studies conducted, pre-COVID-19 emergency admissions by the ambulance were examined and it was determined that most of the trauma cases requiring TT and incision repair were transported by ambulance (15-17).

In the study by Oktay et al. (15), among the emergency department admissions, the first rank was trauma (33.1%), the second rank was cardiovascular system (CVS) diseases (18.5%), and the third rank was neurological diseases (14.2%). In the study of Zenginol et al. (16), 29.80% of the patients transported to the emergency department by ambulance were found to be trauma cases.

In the study by Önge et al. (17), admissions by ambulance were found to be 28.4% trauma, 16.4% neurological and 14.2% CVS diseases. In a study conducted during the COVID-19 pandemic period in 2021, it was observed that the rate of trauma cases transferred to the emergency department by ambulance was 17.7% (18). During the COVID-19 period the decreasement in trauma patients transported by ambulance, can be attributed to tthe decreasement in the number of patients in need of incision repair and TT.

The limitation of the study is the absence of data from private and university hospitals.

CONCLUSION

As a result, with a significant decrease in the number of examinations during the pandemic period, a decrease was observed in the number of interventional procedures except endotracheal intubation. The high number of emergency service visits and procedures has shown the importance of emergency services in our country's health system again.

ETHICS

Ethics Committee Approval: The study was initiated after obtaining the approval number E2-22-1620 of the Ankara City Hospital Clinical Research Ethics Committee (date: 30.03.2022). Our study was conducted in accordance with the ethical standards of the 1964 Declaration of Helsinki and its subsequent amendments.

Informed Consent: Retrospective study.

Authorship Contributions

Concept: A.B., H.C., Design: A.B., H.C., Data Collection or Processing: H.C., Analysis or Interpretation: A.B., Literature Search: H.C., Writing: A.B.

Conflict of Interest: No conflict of interest was declared by the authors.

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