

ABSTRACT

Title: *Analysis of patients admitted to the Emergency Department of a clinical hospital in the years 2010–2019*

Background: Ensuring the wellbeing of the country's population, particularly in terms of healthcare, is one of the paramount responsibilities of national policymakers. First Responder Emergency Medical Services (EMS) have been created and refined in order to prioritize saving human lives. Since its establishment on January 1, 2007, the Polish Emergency Medical Facility and Service System has been continually providing appropriate medical assistance to anyone in a situation that poses an immediate risk to their life or health. This mission has been realized primarily by specialized emergency medical facilities, i.e. hospital emergency departments (EDs), and emergency medical outreach services, including Helicopter Emergency Medical Services of Polish Medical Air Rescue. EDs provide 24-hour medical services delivered by trained personnel, including the diagnosis and management to stabilize the patients' vital signs in situations posing a health risk.

Purpose: The functioning and quality of the Polish Emergency Medical Facility and Service System require constant monitoring and adjusting the available resources to meet the demand. This involves observing the current trends and making the relevant extrapolations. The main aim of this study was to analyze the function of the ED as an integral unit of the Polish Emergency Medical Facility and Service System in general and the evaluated clinical hospital in particular, based on the characteristics of the patients admitted to the ED as the System underwent certain changes over the period of 2010–2019.

Material and methods: This was a retrospective study. The first part of this paper, which presents the functioning of Polish Emergency Medical Facility and Service System in the years 2010–2019, was compiled based on data obtained from the relevant summary reports and the information available on the websites of the Central Statistical Office, Mazowieckie Voivodship Office in Warsaw, Polish National Health Fund, and Polish Medical Air Rescue. Unpublished data were obtained based on *access to information* policies. The second part of this paper presents an analysis of medical records of patients

admitted to the ED of the Infant Jesus Clinical Hospital, which is part of the Medical University of Warsaw. Data accrual and processing was conducted in accordance with personal information protection regulations and had been approved by the hospital administrator and the local ethics committee. The analyzed data, 3,914 entries in total, were selected from the *InfoMedica* system, which includes 308,117 patients. Statistical analyses were conducted with IBM SPSS Statistics (software version 26).

Results: I. Over the period from 2010 to 2019, the total number of Polish citizens decreased by 0.38%, unlike the population of the Mazowieckie voivodship, which increased by 2.96%, and that of the city of Warsaw itself, which increased by 5.33%. At the same time, the number of EMS units increased by 7.28% in Poland, by 6.95% in the Mazowieckie voivodship, and by 19.15% in Warsaw. Over the course of the analyzed decade, the number of specialized EMS units dropped by 42.25% nationwide, by 53.06% in the voivodship, and by 64.00% in Warsaw; with the reverse tendency observed for basic EMS units, whose numbers increased by 45.37% nationwide, by 73.03% in the voivodship, and by 113.64% in Warsaw. The EMS accessibility index, calculated based on the number of ground-based EMS teams per 100,000 citizens, grew by 7.59% nationwide, by 3.94% in the voivodship, and by 13.41% in Warsaw. The number of Helicopter EMS teams increased by 23.57% by the year 2017, ultimately reaching 21. The analyzed decade also saw an increase in the number of EDs (by 8.22% nationwide, by 10.71% in the voivodship, and by 50.00% in Warsaw). The ED accessibility index, calculated based on the number of EDs per 100,000 citizens, increased by 8.77% in Poland, by 7.55% in the Mazowieckie voivodship, and by 42.55% in the city of Warsaw. There was also an increase in the number of patients who received EMS assistance (by 8.83%, 6.89%, and 18.98%, respectively). The proportion of the elderly (individuals aged 65 or older) in the population of patients who received EMS assistance increased by 7.06 percentage points nationwide, by 9.38 percentage points in the voivodship, and by 9.67 percentage points in Warsaw. The total number of ED patients increased by 44.31% nationwide, by 87.30% in the voivodship, and by 127.09% in Warsaw. This included an overall increase in the proportion of the elderly in the ED population (by 3.94, 4.87, and 5.88 percentage points, respectively).

II. The data on the total number of ED patients of the Infant Jesus Clinical Hospital over the years 2010–2019 were obtained from several sources (including the hospital in-house

records and the records collected by national institutions, which revealed certain discrepancies. Despite this problem, the total number of patients who received emergency medical assistance at the ED of the evaluated hospital was ultimately established to be 304,203. From the year 2010 to 2019, the number of patients with ED records increased by 125% (from 16,054 to 36,104, respectively). Each year, males constituted most of the ED patients (54.7% in 2011 and 51.5% in 2018). The proportion of elderly ED patients increased by 3 percentage points overall during the evaluated decade, ranging from 23.0% (in 2015) to 28.3% (in 2019). The mean patient age increased from 47.53 years in 2010 to 49.81 years in 2019, and the median patient age increased by 1 year (from 45 to 46 years, respectively). The proportion of patients whose reported place of residence was an urban area ranged from 78.4% in 2010 to 80.5% in 2019. Within the evaluated time period, the most commonly recorded specific International Classification of Diseases (ICD-10) code for the primary diagnosis was Z00.0 *Encounter for general adult medical examination* (6.3% of the patient population), followed by H57.1 *Ocular pain* (5.0%), and N23 *Unspecified renal colic* (3.6%). However, overall, patients most commonly presented with symptoms classified under ICD-10 codes marked with the letters S and T, namely *Injury, poisoning, and certain other consequences of external causes* (with all the individual specific codes from this broad category collectively characterizing 31.9% of ED visits). It is these circumstances that accounted for ED visits of 41.3% of the 29-year-old and younger patients, 31.5% of patients in the 30–64-year age range, and 23.1% of the patients 65 years old or older. The ED saw the highest numbers of patients during the months of May (9.2%), June (8.9%), and July (8.7%). The days of the week with the highest number of ED admissions proved to be Saturdays (17.6%) and Sundays (17.7%). On weekdays, the greatest proportion of admissions (37.8%) occurred in the afternoons (between 1.01 pm and 7.00 pm), with a slightly different pattern observed over the weekends, when most admissions happened at night (between 1.01 am and 7.00 am) (19.8% on Saturdays and 20.9% on Sundays). The “frequent user” population (defined as the patients with a minimum of 10 ED admissions over the evaluated decade) was made up of 652 patients, who accounted for 3.6% of the total number of ED visits. The mean number of ED visits in this population was 17, and the median was 13. A total of 12.1% of this “frequent user” population were subsequently admitted to another hospital ward, with the proportion of such admissions among other patients at 11.5%. Over the evaluated decade, the mean duration of time the patients spent at the ED (from the time of their arrival being recorded to the time

of discharge) increased from almost 3 hours 30 min (3.48 hrs.) to approximately 6 hours 45 min (6.76 hrs.); the median duration of stay at the ED increased from nearly 2 hours 30 min (2.43 hrs.) to nearly 5 hours (4.93 hrs.). According to data from 2010, the patients with indications for hospitalization spent a mean of 3 hours (3.12 hrs.) at the ED waiting to be admitted to one of the hospital wards, which increased to over 14 hours (mean 14.06 hrs.) in 2019. The corresponding median waiting times increased from 2 hours 40 min (2.63 hrs.) to 5 hours (5.00 hrs.), respectively. The amount of time awaiting admission varied significantly for different target wards of the evaluated hospital.

Conclusions: I. The functioning of the Polish Emergency Medical Facility and Service System in 2010–2019:

1. The data showed an increase in the number, and a change in the type, of active Polish Emergency Medical Facility and Service units, which increased the accessibility indices of both EMS and EDs.

2. The decrease in the overall Polish population was not accompanied by a corresponding decrease in demand for Polish Emergency Medical Facility and Service System units; in the Mazowieckie voivodship both the population and the demand for the System showed increasing trends, which indicates a growing workload for individual units of the System.

II. The population admitted to the ED at the Infant Jesus Clinical Hospital in the period 2010–2019:

1. The evaluated decade saw an over twofold increase in the number of patients who received medical care at the evaluated ED, which was consistent with the data for the Mazowieckie voivodship, but considerably greater than indicated by nationwide data.

2. Male patients constituted most of the patient population. The mean age of patients increased consistently over the years; however, the increase in the proportion of the elderly was not linear, which contradicts the generally adopted belief that the population of elderly ED patients keeps increasing considerably.

3. There were differences in ED admission rates depending on the time of day, day of the week, and season of the year. There were also seasonal changes in terms of the cause of admission. Thorough review and analysis of these data may help in rational decision making in terms of the numbers of active ED personnel.

4. Approximately one-third of the patients presented to the ED with *injuries, poisoning or certain other consequences of external causes*, which may be considered conditions

posing a risk to the patient's health. Nonetheless, the three most common specific primary diagnoses in the overall population of ED patients were *encounter for general adult medical examination*, *ocular pain*, and *unspecified renal colic*, none of which indicates a direct immediate risk to the patient's health.

5. The proportion of patients referred to as “frequent users” (those regularly returning to the ED) who were directly admitted to another hospital ward was not much higher than that of the remaining ED patients, which indirectly indicates that the “frequent user” population used the diagnostic and therapeutic resources of the ED instead of seeking outpatient care.

6. The length of time patients spent in the ED was shown to have increased over the consecutive years from the evaluated period, which may result from an increase in the number of patients presenting to the ED or, perhaps, is due to inadequacies of the healthcare system in general and primary healthcare in particular. Determining the true reason requires conducting targeted analyses.

7. This study revealed a complete lack of some and inaccuracy or some other data gathered by the hospital and discrepancies between those data and the data collected by national institutions. This finding may have far-reaching consequences, as important organizational decisions may be made based on inaccurate or false information. This finding also provides the grounds for conducting studies that would verify the reliability of data used in the planning and management of healthcare resources.

Key words: *emergencies, emergency medical services, emergency department, healthcare services, clinical hospital*