**Introduction:**   
  
A big problem worldwide in the ED is overcrowding. The risk is that delays in this department may cause dramatic outcomes for the life of the patients. The risk increases with the degree of patients flow. The performance of the emergency room in terms of overcrowding, and in terms of resources that are available can be studied using the Queuing Theory. Researches shows that Queuing Theory can be used efficiently in health care. The Queuing Theory was first analyzed by Agner Krarup Erlang, in the context of telephone traffic.   
In this case study, in order to plan the organization for the Emergency Department situated in Durres, Albania, to manage in the best way patients flow, we will use queuing model. We chose queuing model for our analysis to provide accurate evaluations for the Emergency Department performance.  
  
**Model of patient flow**   
  
The health care manager must consider these measures:  
- The average number of patients waiting queue.  
- The average time of patients waiting in queue.  
- Capacity of the department.  
- The cost of this capacity.  
- The probability that the patients will have to wait when they arrive in ED.  
  
The queue system is usually described by using some characteristics represented by A,B,C.   
A = The arrival time   
B = The service distribution  
C = The number of staff available  
etc…  
  
To the queuing model to we should describe the input and the output process. Like for example for the input process the patient’s arrival, and for the output the patient’s admission.   
To build the flowchart of the patient’s arrival and admission we will use queuing model. We consider this model because it will help us estimate the number of providers needed.   
  
**Queue model for ED of Durres Hospital, Albania**  
  
In Albania affected patients access the Hospital through the Emergency Department. The Emergency Department is where the patients continue to receive medical care after the first aid given to the place of the hypothetical accident. They may go to Emergency by ambulance. Once there, patients are diagnosed with the help of the specialists and are kept in surveillance until the admission time.

For our case study we took into consideration the Emergency Department of the Hospital of Durres. It is located in the ground floor and is open for patients to be hospitalized for a duration time of 1 to 24 hours.   
The department consists of some rooms and spaces.

The data used in this study consists on the information collected in a duration time of two years (2017 – 2019). From the data analysis, it results that 38.8% of the patients went to the hospital by ambulance; from which 10% needed immediate medical care. Meanwhile, 28.8% were able to walk.

The process of the work consists in:

The triage defines the gravity of the patient with a numbered label from 1 to 3. Patients with label number 1 go immediately into Reanimation; those of label number 2 receive immediate care, while those with number 3 wait in the waiting room.

**Analyzing the patient flow we will use the queuing theory to estimate the number of ED human resources needed, and estimate the average waiting time.**

These results are important in order to properly manage the Emergency Services, take proper action and organize everything in the best possible way.

In the analyzed data there are 10000 registered patients, with an average of 80 patients per day.

We created a database with all the patients’ information, like name, address, time of seeking medical care at the emergency department, diagnose, time of staying in the emergency.

We gave mathematical values to the number of patient’s arrival in the time interval.

Using a formula, we calculate the number of arrivals per day and per hour and the number of patients waiting in queue. So, we obtain the rate of x/hour of patient’s arrival. The number of x/hour will determine the minimum number of physicians. We can calculate the probability of a new arrival to stay in queue. And then we are interested to know the waiting time in queue. And we can obtain this with the formula. In the end we’ll have the overall number of patients in ED on average.

**Conclusion**:

In this case study we used queue model to analyze the patient flow in the Emergency Department of the Hospital of Durres.

We created a database with the use of 10000 hospital registers of assisted patients during the two-year period of time (2017 to 2019). The study illustrates how the data analysis and queuing model can be used in decision making to find optimal solution. At the emergency services it is very important to have a proper allocation of the recourses: the number of medical staff, the number of beds according to needs, in order to have the shortest waiting time possible.

The queuing model is very useful for capacity planning. The planning can be realized using a computer. However, by experience it is often showed that models are unable to help in complex decision makings like the one in the Emergency Department of a Hospital. This study mostly supports the managers. The model can be used in management of the department as a useful tool in decision making.   
Taking in consideration the budget limitation of the Hospital of Durres, it is required to search for effective ways to improve the service quality using the existing resources.