

## The Effect of Patient Behaviour on Wait Times in Emergency Departments

**Entisar K. Aboukanda**

Corresponding author:

School of Engineering, Manchester Metropolitan University, Manchester UK,  
kenda\_9\_2003@yahoo.com

**Muhammad Latif**

School of Engineering,  
Manchester Metropolitan University, Manchester UK,  
M.Latif@mmu.ac.uk

### Abstract

*Patient flow models have been universally used for planning health services for both acute and chronic patients. These models invariably assume patients are homogenous and events follow traditional queuing models. These techniques are useful for examining patient flow in large population groups where Markov assumptions, or simple extensions of these, can be made. However it is realized that such assumptions are not necessarily representative in cultures and communities that do not adhere to queuing policies particularly in developing countries. This paper explores the need to consider human behaviour within a patient flow model and reports on a study that identifies some of the critical factors that a patient flow system must consider. Therefore, the aim of this study was to identify the problems affecting service time of patients due to their behaviour in Emergency Departments (EDs). Tripoli Medical Centre's (TMC) ED was selected as a case study due to its experiences of over crowdedness and long waiting times. The most important findings indicated by the research and results show, there exist four key behaviour types that patients may have i.e. challenge, confrontation, illness belief, and passivity. These four types of behaviour inevitably contribute to the overcrowding in the ED by disrupting patient flow and consuming additional staff time and resources resulting in a definite increase in waiting time.*

**Key words:** *patient, customer behaviour, emergency department, overcrowding, queue, patient flow, healthcare system.*

### 1. Background:-

An Emergency Department (ED) is a medical treatment facility, specialising in the acute care of patients who attend without a prior appointment having been made [Bloor. K et al, 2000], and [Thomas. H.V, 2013].The department deliver a range of treatments covering a vast arena of different injuries and illnesses; importantly, some of these may be considered life-threatening, and may therefore necessitate immediate, urgent action. Nevertheless, EDs are experiencing many different obstacles and issues owing

to the fact that there has been a significant surge in patient demand; this has subsequently induced the need to ensure services and their overall quality is improved. Within hospital emergency departments, one of the most significant, urgent operational difficulties is patients overcrowding, which is recognized as threatening public health and patient safety [Trzeciak. S, et al, 2003], [Guo. B et al, 2006], [Hoot. N. R et al, 2008], [Ovens.H, 2010] and [Anneveld.M, et al, 2013].

The increase in the ED overcrowding problem has motivated researchers to delve into the issues surrounding the causes and effects, as well as how to establish a solution to this problem. Previous studies have listed the most common causes leading to overcrowding; an overall increase in patient volume, increased, a lack of beds for patients admitted to the hospital, avoiding inpatient hospital admissions by intensive assessment and treatment in the ED, delays in the service provided by ancillary services, shortage of nursing staff and/or physician staff, and a shortage of physical space within the ED [Berger M et al, 1982],[ Lambe S et al, 2003], [Andersson G et al, 2001], [Estey et al,2003] and [Richards.J. R et al, 2000].Furthermore, there has been much published in the academic literature surrounding the consequences of ED overcrowding, such as increased risk of clinical deterioration, prolonged patient wait times, subsequently leading to prolonged pain and suffering, increased patient complaints, decreased staff satisfaction and decreased physician productivity, increased the pressure in terms of managing the hospital effectively, and poor service quality [Bagust. A et al ,1999], [Ahmed.M,2009], [Peck.J , et al, 2010]. Various different studies that have been referred to earlier were focused on the patient flow system in order to study overcrowding within EDs. A patient flow system is a valuable tool for examining and evaluating hospital performance. In fact, the patients in ED usually require the utilisation of various different resources, namely beds, examining rooms, medical procedures, nurses, and physicians. This therefore suggests that the overall patient flow system may be described as a network. In part, patient delays depend on how she/he physically flows through the network, and also on the ways in which information, equipment and other objects flow through it[Huw T.O. Davies et al, 1995]and [Jensen .K, 2006].In fact, previous studies found that the problem in hospitals is that such movements throughout the patient flow network have been stopped or otherwise progress slowly owing to many different reasons, all of which, results in the increase of time e.g. patient waiting time or service time. Waiting in a service facility (e.g. store, bank, laboratory, hospital, and so on) has significant effects on customers' overall perceptions of the quality of service that they seek; hence, waiting process has drawn great attention and has subsequently become a critical element in regard to business operation management [Arnold. J et al, 2010], [Park.J. L et al, 2009], [Garcia.D et al, 2012] and [Milliken. D et al ,2006].In fact, numerous mathematical and operations research have been carried out with the aim of improving the overall efficiency of the waiting process; however, previous studies have solved only part of problem as they do not take into consideration human factors. As waiting involves people, time, and the environment, it is fundamental to incorporate issues related to both the social and psychological perspectives so as to reduce the negative impacts of waiting on customer satisfaction and perceived quality.

Literature into ED's overcrowding makes assumptions based on the ideal behaviour of patients. Owing to the technical challenges involved in modelling realistic human behaviours, existing work has considerable limitations in regard to its domain of applicability and, to some extent, on the validity of the results across a wide application spectrum. It is know that, under stressful conditions, human behaviour deviates substantially from the ideal; particularly when rules and regulations are not enforced, as found in less developed countries, such as in Libya [Milliken. E.M, 1987],[Duxbury.J, 2000] and [Eric.S,

1996].Therefore, the study hypothesizes that human behaviour is a key driver of overcrowding within Libyan hospitals.

To monitor the most significant factors of patients' behaviour that have a negative impact on the time of service and patient flow system, the literatures regarding patient behaviours whilst waiting for service have been reviewed. It has been found that researchers almost agree in terms of assigning a label of 'difficult patient' to those patients who illustrate undesirable behaviours whilst waiting to receive services. The concept of a difficult patient has been defined in literature as 'a patient whose behaviour causes difficulties for others' [Duxbury. J. , 2000],[Eric. S, 1996], [Hull.S.K et al, 2007], and [Roberts.L. W et al, 2003]. With this in mind, it can be seen through the majority of past studies that patient behaviours are generally grouped into four different arenas: challenging, confrontational, passive, and withdrawn. Furthermore, another two groups are assigned to each difficult patient, as being those illustrating defensive behaviours and those showing protective behaviours

Difficult patients, in fact, can affect health services in the following ways [Milliken. E. M, 1987],[Parliamentary Office of Science and Technology, 2001] and [Roberts. L. W et al, 2003]:

- They may cause medical staff to lose their tempers;
- Medical staff may, to some degree, be forced to respond in displeasing ways;
- Medical staff may be unable to carry out their roles efficiently;
- Medical staff may be manipulated to utilize and adopt dishonest approaches to meet needs;
- Medical staff may become angry, anxious or defeated, or may otherwise experience other negative emotions.
- Difficult patients may remain passive and require staff to do more work.
- Negativity is relayed on to further staff and patients.
- Disruptions caused can lead to the following:
  - Increased time consumption
  - Cause further delays
  - Increase the chance of backlog
  - Anger patients within queues and enhance the chance of further disruption or confrontation.

To conclude, a difficult patient behaviour causes obstructions in the service system because such behaviours create a state of chaos and confusion of the system, which negatively affects the service provider and thus leads to weaknesses and sometimes failures to provide the service in a fast and smooth way [Aboukanda. E et al, 2011].Previous studies have failed to address the impacts of patient behaviours on the delay of health services provided and increase patient waiting times, which subsequently increases overcrowding in the centres of health service delivery, and they focus instead directed towards other aspects where we can find numerous studies on the subject of communication [Bakic-Miric et al, 2008] and [Hawken. S.J, 2005]. Notably, others exist in terms of addressing the reasons for violence towards nurses and doctors, and how to reduce its occurrence. Moreover, there are many studies concerned with managing difficult patient behaviors' within health institutions [Wasan. A. D et al, 2005], [Stevens.L. A, 2010] and [Peteet.J et al, 2011].

This paper focuses on exploring human behaviour to realistically predict a patient flow system within a critical hospital environment. This study addresses the following research questions;

- What are the most important behaviours that are considered by doctors and nurses to be undesirable, and are considered a reason to affect the patient flow system and increase the time within EDs.
- What intervals/times of the day witnesses the most undesirable behaviour, and where.
- What is the time spent by the patients who are classed as difficult behaviour, in comparison to the other patients who do not exhibit difficult behaviour.
- Are there any significant differences between normal patients and patients with difficult behaviour, in terms of service times ?
- Are there any other factors, (e.g. staff behaviour, waiting time, place, gender) that aid the development of difficult behaviour?

To explore the effects of difficult patients' behaviour on the service time in the ED, (one of the most important hospitals in Libya was selected as the subject of substantial data collection and observations that would allow the aim and objectives of this study to be achieved). Tripoli Medical Centre (TMC) is an advanced centre for medical education and training of the medical and para-medical staff. It has an emergency department which receives approximately 85 000 adult ED visits per year. The ED service is provided on a 24-hour basis, led by consultants delivering specialised services, such as cardiology.

This study is the first of its kind, it is original and no previous attempts or studies appear to exist dealing with this subject matter of how human behaviour affects an ED. Furthermore, simulation has been used to demonstrate the framework and add novelty to the study to enable an effective analysis to be carried out.

Research carried out within the ED of TMC, enabled important data to be collated. The following is an explanation of the methodology used to collect and analyse data effectively.

## **2. Methodology**

Qualitative research has been used for this study due to its suitability to achieve the aim of this study and analysis of the study's questions. Three primary qualitative methods were employed in this study: questionnaires, interviews, and observations. These methods were implemented in an integrated fashion as the research process unfolded.

### *2.1. Data collection and analysis:*

#### **2.1.1 The Questionnaires**

An open ended questionnaire has been used and targeted towards all doctor and nurse working in the ED of TMC during the data collection period. The questionnaire consists of questions dedicated to capturing the key factors of human behaviour deemed by the staff as having the capacity to disrupt the delivery of patient services. These questions were decided based on the patients' behaviour factors listed through a review of previous literature. The questionnaires were personally distributed to doctors and nurses in early February 2012, and were carefully explained in person to the participants, and were asked to return the questionnaires within two weeks. The rate of response was approximately 75 % (9 out of 12 questionnaires) for doctors and approximately 84 % (11 out of 13 questionnaires) for nurses.

#### **2.1.2. The Interviews**

Multiple semi-structured interviews have been used because of the flexibility of being able to ask a set of prepared questions, while also providing the freedom for the researchers to ask additional follow-up

questions as they see fit. All interviews consist of meeting with participants one on one. Interviews were conducted with 8 doctors and 10 nurses working in the ED of TMC. This was firstly to gain a deep understanding of all processes, rules and procedures that exist in the ED, and secondly to help ensure the validity and accuracy of the information that was collected by questionnaires. In addition, interviews were conducted with 4 receptionists in order to gather their opinions regarding the effect of patients' behaviour on reception services. In actual fact, questionnaires and interviews were a preliminary stage for building an observation method for patients who are presented to TMC ED from 26<sup>th</sup> April, 2012 to 31 May, 2012. The analysis of the findings involved utilising the Microsoft Excel for entry of all the responses into individual fields within a spreadsheet. The spreadsheet system enabled data to be collated into synthesised themes and graphs.

### 2.1.3. The Observations:

Observation targeted minor and non-urgent patients who visit the ED of TMC during 26<sup>th</sup> April, 2012 to 31 May, 2012. These two categories has been selected to be observed based on the results of the questionnaires and interviews that were aimed at doctors and nurses, who assured that minor and non-urgent patients are the only two categories that have difficult behavior which lead to confusion in patient flow throughout the ED. Observation also targeted ED staff i.e. doctors, nurses and receptionists. The results of the interviews and questionnaires identified many behaviors that were believed to be the reason behind confusion in patient flow through the ED. These behaviours were given the highest of consideration when carrying out the observation and in the development of the checklist. The researchers worked very closely with three assistants and they carried out the observation in three key areas as follows; the reception, the triage room and examination room.

To find out the appropriate sample size for the observation, Cochran's sample size formula for categorical data has been used [Cochran. W. G, 1977]. it is given as following:

$$n_0 = \frac{(t)^2 * (p)(q)}{(d)^2} \quad , \quad n_0 = \frac{(1.96)^2 * (.5)(.5)}{(.05)^2} = 384$$

- Where t = value for selected alpha level of .025 in each tail = 1.96.
- Where (p)(q) = estimate of variance = .25.
- Where d = acceptable margin of error for proportion being estimated = .05

To calculate the final sample size, Cochran's correction formula has been used. The calculations are as follows:

$$n_1 = \frac{n_0}{1 - \frac{n_0 * d}{N}} \quad , \quad n_1 = \frac{384}{1 - \frac{384 * .05}{N}} = 361$$

To analyse data that has been gathered from observation methods, IBM SPSS Statistics for Windows, Version 20.0. has been used [IBM SPSS Statistics for Windows, Version 20.0] . A descriptive analysis has been used to summaries patient's characteristics and other factors in relation to patients behaviour. In

order to statistically check the research hypothesis of any association between behaviour and the factors that were displayed in research questions, the chi square test ( $\chi^2$ ) was used for categorical variable, but when there is an ordinal variable the  $\chi^2$  test for proportion has been used to test for linear trend. For continuous variable such as service time, t-tests and analysis of variance (ANOVA) when necessary is used. The justification of the use of the parametric tests (t-test and ANOVA) is because a graphical check on the normality of the data was carried out using Normal plots and it does not show an important departure from normality. The key results obtained are discussion next.

### 3. Results and Discussion

The study hypothesis has been outlined, which assumes that patient behaviours whilst waiting in a service queue is one of the reasons impeding the smooth operation of the patient flow system. To prove the hypothesis, the study relied on a survey of staff working in the ED of (TMC) to find their opinion on the issue of patients' behaviour and its impact on service. In addition, this study conducted observation on patients presented to TMC ED to capture, to what extent patients' factors affect the system.

#### 3.1 Questionnaire and interviews results:

From the questionnaire sent to the ED staff in TMC: there were 9 doctor respondents, who represent 75% of the total questionnaires sent, and 11 nurses respondents, who represent 85%. The staff were asked about how long they had worked in the ED and most staff who responded (doctors and nurses) had been in their jobs over five years (approximately 67% for Doctors and 73% of nurses). This result indicates that they have gained good experience to be able to give reliable views.

When staff asked about the existence of the overcrowding in the ED, 77.7% of the doctor respondents agreed, joined by approximately seventy three percent (72.7%) of the nurses. The staff were also asked to indicate whether they felt that difficult patients' behaviour issues had a negative impact on the work of their ED, and almost seventy eight percent (77.7%) of doctors and 81.8% of nurses felt that it did. This results obviously show the importance of conducting such a study in order to discover the importance of this problem and work on finding a suitable solution.

The factors that researchers found in literature that are considered as significant patient factors affecting the service in emergency departments, have been discussed with the staff via interviews and questionnaires. The analysis of interviews and questionnaires showed that almost all responders agree on some factors, and they emphasise that these factors, which are shown in table 1, are the fundamental elements known to play a role in service delivery negativity in ED of TMC. Table 1 also display the staff opinion about how does each factor effect the services.

Table 1: Table shows the significant patients factors affecting the service in emergency departments.

Patient Behaviour Factors			Staff Responses	
No.	Factor	How it could affect the services	Doctor	Nurse

1	<b>Defensive behaviour, including:</b> Challenges, including: Interfering Over-involvement Demanding. Confrontation, including: Anger Arguing Lack of respect	Capacity issues Disturbance of service because of the complaint and objection Requires a long time to deal with them.	88.9%  77.8%	72.7%  63.6%
	<b>Protective behaviour, including:</b> Passivity: cultural influences ( discrimination, lack of respect the rule, e.g. jumping the queue Communication difficulties.	Disturb patient flow Requires a long time to deal with them.	55.5%	81.8%
3-	<b>Illness Belief</b>	Capacity issues. Requires a long time to deal.	55.5%	45.5%

Majority of the doctors and nurses involved in this study ( 89 % doctors, 91 % nurses) agreed that, minor and non-urgent patients were showing the most difficult behavioural issues, which leads to a delay in service and crashes the system. This prompted the researcher to focus only on these two groups of patients in observation.

In order to understand staff opinion to the best of abilities about the most difficult behaviour that effect patient flow system, they were asked to highlight factors shown in table 1 in order to assess the level of seriousness, starting from major effect on services, ending with no effect on services. The results highlighted that doctors considered over-involvement, demanding, and urging, the most important behavioural factors to cause confusion at work. These behaviour, as interpreted by the doctors surveyed, mean that patients who carry these behaviour, are usually not of an urgent case and nature, but rather non urgent or minor cases, they tend to interfere in the doctor's decision. For example, patients get involved with the type of tests that doctor choose and the diagnosis. According to the ED doctors' explanation, staff should investigation and treat all types patients who are presented in the department, regardless of condition; therefore, these behaviours lead to an increased number of patients waiting in queues as increased time is consumed dealing with such patients, which causes the overcrowding. Nursing staff believe that the most important factor that impedes their work is queuing behaviour i.e., jumping the queue and demanding to be at the head regardless of condition and urgency. Nurses also think that the intervention in the treatment and the long arguments with staff are difficult behaviours, which lead to delay in services. See table 2.

Table2. Shows staff opinion about the most serious difficult patient’s behaviour that effect services.

Behaviour Factors	Level of Seriousness	
	Doctors %	Nurses %

	Major effect	Minor effect	No effect	Major effect	Minor effect	No effect
Over-involvement	88.9	11.1	0	63.6	36.4	0
Demanding	77.8	11.1	11.1	72.7	18.2	9.1
Arguing	66.7	22.2	11.1	54.5	27.3	18.2
Lack of respect	55.6	11.1	33.3	81.8	18.2	0
Illness Belief	55.6	0	44.4	27.3	45.4	27.3
Communication difficulties.	33.3	55.6	11.1	45.4	36.4	18.2
cultural influences	22.2	44.5	33.3	18.2	45.4	36.4

The staff also were asked to indicate the negative effects caused by the difficult patients' behaviour on the work in the TMC emergency department, and it was found that doctors (approximately 89 %) and nurses (approximately 82%) agreed that difficult patient behaviour, increased patient waiting time for service. Seventy eight percent of doctors and 73% of nurses believed that unacceptable patient behaviour disturbs the patient flow system. In addition, 67% of doctors and 55% of nurses responded that difficult behaviour contributes of staff dissatisfaction, which negatively affects the quality of service provided.

Respondents were asked for more service areas experiencing unacceptable behaviour. The results show that there were three service areas experiencing delays because of the difficult behaviour of some patients. Table 3 shows those areas, and also shows the average real-time service, and the estimated average time that respondents believed that the difficult patient takes in addition to real service time.

Table 3: shows the most important service areas for the recurrence of unacceptable behaviour, and staff estimation of the extra time taken by difficult patients

Service area	Repeated behaviour	Mean timeto provide the service(mins)	mean estimate extra time (mins)
<b>Triage</b>	Interfering	6	7.5
	Arguing		
	Communication difficulties		
	Illness Believes		
	Aggression		
<b>Reception</b>	Demanding	3.5	4
	Aggression		
	Lack of respect		
	cultural influence		

	Communication difficulties Alcoholism		
<b>Examination</b>	Communication difficulties Arguing Illness Believes	15.5	7

### 3.2. Observation Results

Observation was conducted to find out the most important human factors that contribute to the obstruction of the system, and to monitor the time consumed by a patient who carries undesirable behavior comparing with normal patient. also to find out to what extent the behavior affects the length of stay (LOS). Observation enabled the researchers to understand and assess the most important factors that drive the existence of behavioral impacts. Human behavior as an important factor and an inevitable route to the causes of overcrowding, resulting in delayed services in emergency departments.

A descriptive analysis summarising the patient's characteristics and other factors in relation with his/her behaviour is displayed in Table 4.

Table 4: Distribution of Patient's characteristics by existence of behaviour.

			The Existence of Behaviour		
			Difficult Behaviour	Normal Behaviour	Total
The Places	Reception	N (%)	75(49.7%)	18(8.6%)	93(25.8%)
	Examination	N (%)	46(30.5%)	150(71.4%)	196(54.3%)
	Triage	N (%)	30(19.9%)	42(20%)	72(19.9%)
sex	Male	N (%)	81(53.6%)	114(54.3%)	195(54%)
	Female	N (%)	70(46.4%)	96(45.7%)	166(46%)
Patient Age	20-30	N (%)	38(25.2%)	54(25.7%)	92(25.5%)
	30-40	N (%)	58(38.4%)	58(27.6%)	116(32.1%)
	40-50	N (%)	25(16.6%)	49(23.3%)	74(20.5%)
	> 50	N (%)	30(19.9%)	49(23.3%)	79(21.9%)
Time of observation	8:00 am - 10:00 am	N (%)	22(14.6%)	26(12.4%)	48(13.3%)
	10:00 am - 12:00 pm	N (%)	33(21.9%)	33(15.7%)	66(18.3%)
	12:00 pm - 2:00 pm	N (%)	64(42.4%)	90(42.9%)	154(42.7%)
	2 : 00 pm - 4:00 pm	N (%)	29(19.2%)	55(26.2%)	84(23.3%)
	4:00 pm - 6:00 pm	N (%)	3(2%)	6(2.9%)	9(2.5%)
Confrontation behaviour (B1)	Yes	N (%)	53(35.1%)	0(0%)	53(14.7%)
	Normal	N (%)	0(0%)	210(100%)	210(58.2%)
	Not Applicable	N (%)	98(64.9%)	0(0%)	98(27.1%)
Challenge behaviour (B2)	Yes	N (%)	60(39.7%)	0(0%)	60(16.6%)
	Normal	N (%)	0(0%)	210(100%)	210(58.2%)
	Not Applicable	N (%)	91(60.3%)	0(0%)	91(25.2%)
Passivity behaviour	Yes	N (%)	11(7.3%)	0(0%)	11(3%)

(B3)	Normal	N (%)	0(0%)	210(100%)	210(58.2%)
	Not Applicable	N (%)	140(92.7%)	0(0%)	140(38.8%)
Illness belief behaviour (B4)	Yes	N (%)	27(17.9%)	0(0%)	27(7.5%)
	Normal	N (%)	0(0%)	210(100%)	210(58.2%)
Intensity of Behaviour	Not Applicable	N (%)	124(82.1%)	0(0%)	124(34.3%)
	Mild	N (%)	28( 18.5%)	0( 0%)	28( 7.8%)
	Moderate	N (%)	69( 45.7%)	1( 0.5%)	70( 19.4%)
	Severe	N (%)	53( 35.1%)	0( 0%)	53( 14.7%)
The Reasons of Difficult Behaviour	Not Applicable	N (%)	1( 0.7%)	209( 99.5%)	210( 58.2%)
	Long Waiting Time	N (%)	60(39.7%)	0(0%)	60(16.6%)
	Leak Organisation	N (%)	47(31.1%)	0(0%)	47(13%)
	staff behaviour	N (%)	37(24.5%)	0(0%)	37(10.2%)
	no answer	N (%)	7(4.6%)	0(0%)	7(1.9%)
Staff Behaviour	Not Applicable	N (%)	0(0%)	210(100%)	210(58.2%)
	Positive Staff Interaction	N (%)	49(32.5%)	0(0%)	49(13.6%)
	Negative Staff Interaction	N (%)	65(43%)	0(0%)	65(18%)
	Neutral Staff Interaction	N (%)	37(24.5%)	0(0%)	37(10.2%)
B1_Time	Not Applicable	N (%)	0(0%)	210(100%)	210(58.2%)
	Median (IQR)		7 (11 - 6)	8 (12 - 4)	8 (12 - 6)
B2_Time	Mean(SD)		11.6(8.5)	8.5(4.0)	9.1(5.4)
	Median (IQR)		10.5 (15 -9 )	8 (12 - 4)	9.5 (12 - 7)
B3_Time	Mean(SD)		14.5(9.1)	8.6(4.0)	9.9 (6.1)
	Median (IQR)		8 (18- 7)	8 (12 - 4)	8 (12 - 5)
B4_Time	Mean(SD)		12.6(7.7)	8.6(4.0)	8.8(4,3)
	Median (IQR)		17 (26 - 10)	8 (12 - 4)	9 (12 - 6)
	Mean(SD)		18.1(8.9)	8.6(4.0)	9.6(5.7)

The information that can be extracted from the Table 4 shows that, “Reception” is the most likely place for difficult behaviour (approximately 50%) of observed patients during study's period have carried at least one type of unacceptable behaviour that has been addressed in table 4, and male patients causing most of the problems, patients age that fall in the band “30 – 40”, patients that arrive between “12:00 pm – 2:00 pm” are more likely to have behavioural issues. The most likely reason of abnormal patient behaviour is the “long waiting time” and the response of staff to patients that await to be seen.

In order to statistically check the hypothesis of any association between behaviour and the factors displayed in Table 4. The test on association between the “Place” that has been observed and the existing of behaviour is statistically significant, when  $\text{Pearson } \chi^2(2 \text{ df}) = 84.74$ ,  $P\text{-value} < 0.001$ . The presence of any difficult behaviour varies depending on the observed places, it means that behaviour does not happen at the same pace in all areas such as reception, triage, and examination.

To test the time of observation taken by the researchers and the existing of behaviour, a test on proportion is used, and it shows that there is no significant trend or association. Overall  $\chi^2(4 \text{ df}) = 4.241$ ,  $p\text{-value} = 0.3743$ ,  $\chi^2(1 \text{ df})$  for trend = 3.191,  $p\text{-value} = 0.0741$ ,  $\chi^2(3 \text{ df})$  for departure from linearity = 1.051,  $p\text{-value} = 0.7890$ .

Gender is not statistically associated with behaviour, when Pearson  $\chi^2$  (1 df) = 0.0146 p-value = 0.904. This result comes contrary to the expectation of staff who have confirmed that the difficult behaviour is more likely to happen among men rather than women.

A test was carried out to know whether there is a significant relationship between the patient's age and his/her behaviour by a test on proportion, found that there is a significant association between patient's age and their behaviour, when Overall  $\chi^2$  (3 df) = 13.190, p-value = 0.0042, and also a linear trend, when  $\chi^2$  (1 df) for trend = 10.722, p-value = 0.0011. This result was consistent with the expectations of staff, who confirmed the existence of a relationship between behaviour and age, and they said that most of the carriers of difficult behaviour are aged between 20-40.

T-tests for service times were carried out to check for any difference in time on average for the "behaviour" factor. T-test with unequal variances was also used as it shown in Table 4 that the standard deviations of the times in the two groups (difficult patients and Normal patients) are different. For Confrontation Behaviour (B1), there was a statistically significant difference between the two groups, where, p=0.0128. For Challenges Behaviour (B2), there was a statistically significant difference between the two groups, p<0.001. For Illness belief (B4), there was a significant difference between the two groups p<0.001. However, the statistic found that there was no evidence of any difference in time on average between the two groups in terms of Passivity Behaviour (B3), when found p=0.109.

If we look at Table 5 and take confrontation behaviour as an example and under consideration, we find that the average time that has been spent by a patient who carries Confrontation Behaviour is over three minutes than the normal patient in the reception area, and about 14 minutes in examination area, and this difference is very important and should be taken into account. The time taken due to Confrontation Behaviour is higher than the time of normal patient by approximately 4 minutes. Research highlighted staff take approximately four minutes for a screening, hence the time has increased two fold, consuming enough time to screen a further patient. Which is extremely important, which makes human behaviour very important element of the delay in service, and the cause of the reasons for overcrowding in emergency departments, and researchers must take this into account and studied extensively to develop logical and scientific solutions to reduce the time spent by the patient who have difficult behaviour. Similarly, table 5 shows the time consumed due to the nature of the other behaviours, all of which consume a considerable amount of time and absolutely effect the system negatively resulting in long waiting time and overcrowding within the ED.

Table 5: Summary Statistic for Service times by Place and Behaviour

		The Place					
Behaviour Type		Reception		Examination		Triage	
		The Existence of Behaviour		The Existence of Behaviour		The Existence of Behaviour	
		Difficult	Normal	Difficult	Normal	Difficult	Normal
Confrontation	Mean	6.57	3.22	25.54	10.53	8.25	3.64
	Standard Deviation	1.00	.88	5.14	2.92	1.71	.82
Challenge	Mean	8.83	3.22	31.42	10.59	12.61	3.64
	Standard Deviation	1.91	.88	4.38	2.86	2.59	.82
Passivity	Mean	6.83	3.22	19.60	10.59	N/A	3.64
	Standard Deviation	.75	.88	5.90	2.86	N/A	.82
Illness Belief	Mean	8.91	3.22	24.38	10.59	N/A	3.64
	Standard Deviation	2.66	.88	5.34	2.86	N/A	.82

#### 4. Conclusion:

This study shows that the staff who work in the ED at TMC believe that the presence of difficult behaviour of patients is a very important reason for the delay and weakening of the quality of department services delivery. The study enables greater understanding from a ED staff perspective, it identifies four key behaviour types that cause disruption that affects the quality of service and service times, the most important negative effects and service areas affected by the four abnormal behaviour types identified. Staff exclusively identified that non-urgent and minor patients showed these excessive difficult behaviour types that disrupted the system and everyday processes. The remaining types of patients that represent a higher acuity level did not consist of such apparent levels of abnormal behaviour. This was due to the nature of their visit to the ED which required immediate if not very urgent attention that was provided in an adequate process. These high level acuity cases did not consist of very long waiting times and further are not congested with the same amount of patient numbers.

The staff's estimation for the extra waiting time caused by those difficult patient' behaviour has been represented in this study.

Observations that have been conducted in this study show where and when the difficult behaviour most occurs, and why it happens, in addition, this study shows exactly how much each type of difficult behaviour takes in minutes, and how it effect the total time consumed.

From this study and the results shown thereof, we conclude that it is necessary and very important from not only a researchers point of view but from a ED staff perspective, to find a scientific and logical solutions to resolvethe problem. As the problem of overcrowding and excessive waiting time only drives negativity throughout the ED, both physically, due to the resources required and emotionally as patients and staff are stressed constantly.

The most important of these solutions is the restructuring of the patient flow system to address the most common difficult behaviours within the ED. A process where patients with abnormal behaviour can be segregated from the normal patients in order to enable a forward moving efficient service.

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