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Abstract

The Portuguese national health service (NHS) is expected to provide safe and high quality care 24 hours a day, seven days a week. Everyday, patients with non-life threatening, short-term illnesses or health problems, for which they need convenient treatment or advice, use emergency care departments at hospitals. It is estimated that about one third could have been treated, or advised elsewhere, mainly in primary care (PC), community pharmacies or the national help phone line. This “inappropriate” use of emergency care departments represents an added cost, and a decreased efficiency for the Portuguese NHS. The literature suggests several explanations, either focusing on the system, or patients. This paper analyses whether a misperception of the severity of the health condition by the patients explain the excess demand. Results show that, in fact, there is an overestimation of the degree of severity of some clinical profiles, and therefore a preference for the use of emergency departments. However, when confronted with the real severity of those clinical profiles, only 50% of the cases change the choice of the emergency department (ED). It can also be derived from the results that socio-demographic characteristics and variables related to experience, with the services, and the clinical profiles are important determinants in the perception of severity of the clinical conditions.

Keywords: Emergency department demand; experimental economics; elicitation of beliefs

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Introduction

The Portuguese NHS is expected to provide safe and high quality care 24 hours a day, seven days a week. Everyday, patients with non-life threatening, short-term illnesses or health problems, for which they need convenient treatment or advice, use emergency care departments at hospitals. It is estimated that the number of visits to ED has increased in all OECD countries, being Portugal on the top with around 70 visits per 100 habitants in 2011. While in other countries the most common reasons are related with injuries, in Portugal 80% of the visits to ED are because of diseases (Berchet, 2015). Considering these visits, it is estimated that about one third could have been treated or advised elsewhere, mainly in primary care services (PCS), community pharmacies or the national help phone line. This ‘inappropriate’ use of emergency departments (ED) can significantly compromise the efficiency of the health system by compromising the timely treatment of emergency situations. In addition, the cost of treatment in ED for non-emergency conditions is substantially higher than in PCS, community pharmacies, or national help phone line. Moreover, the visit to a higher level health service than necessary, may represent a significant loss in welfare for subjects, as it can be subject to higher waiting time, higher travel distances from patients’ residence and to more stressful environment as patients are in contact with more severe health conditions and trauma situations.

Literature suggests that, inappropriate demand for ED care may be partly explained by over-perception of severity and risks of a health condition, and by users’ preferences for specific characteristics of health services, by the deficient functioning or difficulty of access to PC non-scheduled appointments and, in minor cases, by preventive medicine. Although the problem and its determinants are multidimensional, our focus is on subjects’ perceptions. Hence, instead of asking how the system should be changed to improve its efficiency, which is the most common approach, the paper proposes to question whether patients’ self-diagnosis of severity and need of care is accurate. The confrontation of the expectations of the patients, with the actual conditions, may highlight some interesting policy initiatives to improve the system’s overall efficiency by focusing on the patients.

Literature review

Overuse of ED in hospitals is of concern in Portugal, as well as in other European countries, and it is often referred to as 'inappropriate' use. There is no universal definition of 'inappropriate', or a non-emergency care department visit, but most of the literature categorizes as 'inappropriate' use, those cases which could have waited to be treated in PC (Durand *et al.*, 2011). Inappropriate use is thus seen to compromise efficient ED, and to increase the overall cost of the system (Dale *et al.*, 1996). Moreover, inefficient use, also threatens timely treatment of serious medical conditions at emergency care services (Bittencourt and Hortale, 2009). Despite the increasing response of PC to urgent care, in Portugal, 30%-40% of ED visits are inappropriate (Pereira *et al.*, 2001). Every winter, this pressure increases further, and the signs are most visible in ED, where this year's cold snap resulted in a very considerable strain.

There is a considerable amount of literature on factors that lead patients to choose ED services instead of PC and specialized health services. Results may be grouped into four main categories (Lega and Mengoni, 2008). The first is connected to the perception of severity, and the consequent need to receive immediate care. According to Pasarín *et al.* (2006), this perception is strongly associated with the decision to choose hospital emergencies, and relates it with whether the patient self-diagnosed, i. e., whether the patient came to a conclusion, correctly or not, of the symptoms they were experiencing. Thus, inappropriate choices of ED's are motivated by patients' misperception of severity of the condition, the need to have someone they trust ensuring that the condition is not serious, and the need to seek relief and comfort (Wollinsky *et al.*, 2008; Baker *et al.*, 1995). The second group is connected with preferences for the services offered in ED, which includes the convenience such as being attended in a setting where it is possible to do laboratory and other tests (Coleman *et al.*, 2001), waiting times, value attributed to continuity of care (Carret *et al.*, 2007), and the belief that ED services have higher quality (Razzak and Kellermann, 2002). Third group of reasons relate to the access to PCS, efficiency of the PC and the understanding of the system. Specifically, some studies find that the long waiting times to access PC services and the difficulty on accessing appointments after working hours, are important reasons not to choose PC and choosing ED's instead (Pasarín *et al.*, 2006; Sempere-Selva *et al.*, 2001). The fourth group relates to "defensive" medicine behaviour by health professionals, or wrong diagnosis. In several studies, subjects state they went to the ED by indication of

the general practitioner, pharmacist, or other health service providers (Afilalo *et al.*, 2004; Howard *et al.*, 2005).

Experimental Design

When faced with an unexpected health condition, citizens need to decide which health service is better to address the problem in hand. In Portugal they may go (i) to the pharmacy, and there seek some advice on over the counter medication; (ii) alternatively, they can access the telephone line 24--24 for advice; (iii) they can go to PC non-schedule appointments; (iv) or they can choose to go to hospital emergency rooms. Their choice decisions depend on a number of factors that can be grouped into two: their own evaluation of the severity of the condition and their expectations on type of care needed, and their expectation regarding the services they'll be provided under each choice alternative. In this framework, two types of errors may occur: the patient may underestimate the severity of the condition and access a lower level of care first, having to go to a higher level service later; or the subject may overestimate the severity, and access a higher than necessary service level. In both scenarios, the system, citizens and health services end up suffering from inefficiency. Increasing the efficiency of the system is to decrease the probability of occurrence of these errors. Said errors may result from a misperception of the subjects, or from an ill design of the urgent and emergent care system.

In order to evaluate if the subjects misperceptions are the origin of the excessive use of hospital's emergency rooms, we propose to elicit subjects' expectations regarding the care needed, given specific health conditions. The confrontation of the expectations of the patients with the actual conditions may highlight some interesting policy initiatives to improve the system overall efficiency. Moreover, as one of the priorities of the Portuguese National Health Plan for 2012-2016 is to develop a citizenship's culture, where citizens' literacy, training, empowerment and participation is promoted, the knowledge of people's perceptions regarding the severity of health conditions, and the services provided by each type of health care service for non-scheduled care is fundamental.

It is hypothesized that when faced with a specific set of health symptoms, patients evaluate the degree of severity of the health condition, and then decide which health

service to use. If their evaluation is correct and their expectations regarding the service offered by each health unit is correct, then there is no inefficiency at this stage. However, subjects' evaluation might be incorrect. In order to ensure truthful revelation of assessment by subjects they are rewarded by how many diagnosis classification they get right. The definition and classification of the conditions are defined by the medical doctor using the Manchester triage system. The methodology used in the elicitation is Experimental economics which enable collection of data in a controlled setting. Recruitment for the experimental sessions is to be undertaken with collaboration of local civic organizations.

The experiment is designed in several stages. All information was provided in writing and read aloud. Payments were done at the end of the session individually.

Stage 1: upon entering the room, subjects are asked to read and sign an informed consent form, specifying that their participation was voluntary and anonymous, that the organization they belonged to, would be rewarded in five Euros for their participation, condition on their presence until the end of the session. However, it was made clear that they could leave at any moment. Subjects were seated sufficiently apart to ensure privacy.

Stage 2: In addition to a brief introduction, a full explanation of the Manchester triage system was provided as well as the explanation of the first task. The first task consisted in the following:

- participants are presented with five specific sets of health symptoms (Table 1)

Table 1: Clinical profiles description.

Clinical profiles	Symptoms
1 Diarrhea	- diarrhea - history of occasional blood in the feces - abdominal pain
2 Flu	- muscle pain - shivering - runny nose -cough
3 Urinary infection	- urinary problems - pain when urinating and burning sensation - presence of some blood in urine
4 Insect bite/ anaphylactic shock	- insect bite - severe pain - shortness of breath
5 Back pain	- back pain - no trauma - no fever - walking difficulty

Stage 3: subjects were asked to choose which health service they would visit if they've experienced each set of symptoms from a list of possible existing health services.

Stage 4: Subjects were given information on the correct classification, according to classification that each set would be attributed by any health service. After recording this information they were asked to review their health service choice decision.

Stage 5: a questionnaire on personal characteristics, knowledge and experience with health services, and health conditions was then delivered.

Stage 6: payments were computed and done privately.

At each stage, subjects were of informed of the specifics of the next stages. However, they knew that more stages would follow.

Results

In total, 7 experimental sessions were run during November 2015. Sessions lasted about 1:30 hours, had between 7 to 10 participants, for a total of 55 participants. The sample has a similar split between men and women (65.5% women), the average age is 50 years, and a little over 50% of respondents are married. Regarding their working

situation, 44% are employed workers, 13% unemployed and 27% retired. Regarding education, more than 50% of participants have at most a high school level degree, which means level 3 (Table 2).

Table 2: Sample characteristics.

Variables	N	Mean	Median	Stdev	Min	Max
Women	55	0.655	1		0	1
Age	54	49.667	50	15.970	19	82
Civil status:						
Married	55	0.545			0	1
Single	55	0.236			0	1
Widow	55	0.073			0	1
Schooling	54		3		1	4
Working situation:						
Payed worker	55	0.436			0	1
No work	55	0.127			0	1
Retired	55	0.273			0	1
Beneficiary of social support	54	0.148	0		0	1
Income class	50		3.5		1	8
Familiarity with Primary healthcare services	50	0.920			0	1
Familiarity with ED	50	0.800			0	1
Familiarity with National Health System	51	0.902			0	1
Familiarity with NHS services	50	0.780			0	1
Familiarity with help-phone line	52	0.827			0	1
Use of help-phone line	46	0.326			0	1
Satisfaction with help-phone line	16	0.938			0	1
Satisfaction with possibility of using diagnostic medical equipment in primary care	47		3		1	5
Satisfaction with primary care in general NHS as the only health subsystem	55		4		2	5
Beneficiary of ADSE	54	0.667			0	1
Health Insurance	54	0.241			0	1
Exempt from NHS fees	52	0.173			0	1
Has family doctor	54	0.352			0	1
Has family doctor	55	0.964	1		0	1
Days for appointment in primary care	47	21.957	15	17.618	0	60
Waiting time (min) in scheduled appointment in primary care (in the day)	47	34.149	30	28.040	0	120
Waiting time (min) in ED	31	157.742	120	108.711	0	480
Private transport	51	0.627			0	1
Travel time to public hospital (min)	49	14.531	10	10.924	0	60
Travel time to private hospital (min)	37	16.081	10	13.496	5	60
# Visits to a specialist per year	48	2.688	2	3.777	0	24
# Visits to family doctor per year	49	2.551	2	2.042	0	12
# Visits to ED per year	36	0.944	1	1.194	0	6

Even though they are familiar with primary health care services and emergency departments, more participants are familiar with the former, a significant lower fraction is familiar with the telephone help-line, and only a third of the respondents have ever used it. However, among those that have, 93.8% are satisfied with the service. Regarding PC, on a scale of 1 to 5, at least 50% of the respondents have a degree of satisfaction of 4, although with the possibility of having diagnostic medical equipment in PC, the degree of satisfaction is only 3. The waiting times are remarkably different, in PC, on average, the waiting time is 34 minutes, while in ED is 157 minutes, in other words, over 2 and a half hours. Regarding the access to both types of care, they are both close with respect to travel time. Also relevant for the problem in hand is the intensity of use. On average, our subjects visit a specialist 2.7 times a year and 2.6 times the family doctor, contrasting to less than a visit per year on average to the ED.

Concerning the reasons to visit an ED, we posed a multiple choice question with the alternatives regarding “availability of PCS”, “knowledge of other services”, “preference for ED”, “experience with ED”, “health condition” and “referencing and need”. Table 3 shows the most frequently chosen options by the subjects. As a matter of fact, subjects say that they go to an ED because they “Considered the situation an emergency”, with 46.9%. Other options are chosen, but there is a prevalence of reasons connected with perception of severity, confidence of the service, and also because there is no other service available (the latter is one topic to explore in future studies, regarding inappropriate visits to ED).

Table 3: Reasons for visit to ED.

	N	Mean	Min	Max
Did not have an alternative	50	6.0%	0	1
Did not know any other service	50	12.0%	0	1
No other service was open	50	6.0%	0	1
Did not know if family doctor was available	50	8.0%	0	1
Confidence in ED	49	24.5%	0	1
Considered the situation an emergency	49	46.9%	0	1
Referred by family doctor	47	27.7%	0	1
There is no other place in addition to the emergency room with 24-hour service	48	29,2%		
It was easier to go to ED than make an appointment at the family doctor	48	12,5%		
I had no opportunity to be attended by the family doctor who wanted	50	18,0%		
I thought I needed an X-ray	47	17,0%		

Regarding the health condition of participants (Table 4), about 19% has some rheumatic condition, 15% suffer from allergies, one third of participants has another chronic disease and 14% has a psychiatric disease, showing some self-experience with health conditions. On a scale of 1 to 5, where 1 is the least healthy and 5 is most healthy, the median response was 4, revealing a good health status on the opinion of the majority of the sample.

Table 4: Sample health conditions.

Variables	N	Mean	Min	Max
Diabetes	52	0.077	0	1
Active cancers	52	0.019	0	1
Rheumatic diseases	52	0.192	0	1
Serious allergies	53	0.151	0	1
Other Chronic diseases	50	0.360	0	1
Psychiatric diseases	51	0.137	0	1
Health status	55		1	5

Finally, the subjects experience with the specific clinical profiles used, can explain their behavior. Table 5 reveals that 54% of the subjects experienced one or more clinical profile, the most frequent being profile 2 (Flu) and 5 (back pain).

Table 5: Relation to clinical profiles (a respondent could have had more than one profile, thus percentages don't sum to 1).

	N	Relative frequency
Had any of the clinical profile	48	54.2%
Had Clinical profile 1 -Diarrhea	25	16.0%
Had Clinical profile 2 - Flu	25	64.0%
Had Clinical profile 3 – Urinary infection	25	40.0%
Had Clinical profile 4 – Insect bite/ anaphylactic chock	25	12.0%
Had Clinical profile 5 – back pain	25	52.0%

Having rated the severity of each profile, subjects were informed of the correct classification of each symptom. Table 6 shows the classification and the appropriate health service for each profile. In addition, it shows the relative frequency of correct answers. Overall, subjects were correct 31% of the time. The percentage of correct answers is quite similar across profiles but for profile 3, which subjects over evaluate its severity.

Table 6: True classification of severity of condition, corresponding health service, and relative frequency of correct answers.

	Severity level	Health service	N	Fraction of correct answers
Clinical profile 1 -Diarrhea	Level 3- yellow	ED	55	45.5%
Clinical profile 2 - Flu	Level 4-green	Not ED	55	36.4%
Clinical profile 3 – Urinary infection	Level 4-green	Not ED	55	5.5%
Clinical profile 4 – Insect bite/ anaphylactic chock	Level 2-orange	ED	55	38.2%
Clinical profile 5 – back pain	Level 4-green	Not ED	55	40.0%
Overall			275	33.1%

Analyzing the choices of health services for non-urgent profiles (3 profiles), the most frequent choice was making a PC appointment, followed by a visit to the hospital emergency room.

For profile 1 and 4 the best option is to go to the ED, which was indeed the choice of most subjects. On other profiles the most correct choices are: go to family doctor, go to pharmacy or call the national help phone line; which, are in fact the most frequently chosen options. However, for profile 3 (urinary infection) the preferred choice was ED, which reiterates the overestimation of the degree of severity.

After information on the degree of severity of these profiles, from those that had chosen the emergency room when not necessary, only 50% altered the health service choice.

To understand the determinants of a correct evaluation of the severity of the health conditions, a probit model was estimated.

Table 7: Probit results (clustered by individual), marginal effects presented, Stderror in parenthesis.

Variables		Marginal effects (Delta method)	
Age:			
	Female = 0	0.0203***	(0.0050)
	Female = 1	-0.0048	(0.0083)
Female:			
	Age = 20	0.0083-	(0.1829)
	Age = 50	0.5455***	(0.0922)
Age		0.0035	(0.0059)
Female		-0.3703***	(0.0622)
Level 2 schooling (second and third cycle)		0.4878***	(0.1640)
Level 3 schooling (high school)		0.2893*	(0.1529)
Level 4 schooling (universitary)		0.2436	(0.1870)
Paid worker		0.2675***	(0.0962)
Know ED		-0.3911***	(0.0907)
Chronic disease (others)		-0.4507***	(0.0522)
Time to public hospital (min)		0.0089	(0.0064)
Waiting time at primary care (min)		-0.0053**	(0.0021)
Waiting time at ED (min)		0.0008*	(0.0004)
Reason for going to the ED: Confidence in the ED		-0.1758*	(0.1056)
# yearly visits to family doctor		0.0689**	(0.0297)
Had at least one clinical profiles		0.1755**	(0.0800)
Clinical profile 2		-0.1399	(0.1235)
Clinical profile 3		-0.5690***	(0.1195)
Clinical profile 4		-0.1876	(0.1256)
Clinical profile 5		-0.1936	(0.1467)
Pseudo R ²		0,3053	
AIC		138.1843	
BIC		191.2635	
Number obs		105	

Regarding demographic factors and social structure, respondents' sex, age and schooling have a significant impact on the probability of being correct in the assessment of severity degree. The variable schooling, having a positive effect, is in accordance with previous results, however it appears to have impact only for level 2 and 3, comparing with level 1. In addition, interacting age with sex we found that the effect of gender depends on the age of the subject, and vice-versa.

Concerning the knowledge of health services, on average the difference in the probability of answering correctly for those that know the ED services, relative to those that don't, is 39.11 percentage points less likely, *ceteris paribus*. This result may be explained by the fact that these users are conscientious that every patient in an ED is treated, independently of being in a serious or not so serious health condition.

In the category of genetic and psychological determinants, having a chronic disease is statistically significant and has a negative influence on the probability. This might be explained by the fact that a person with a permanent health condition might consider any other additional condition more seriously than those subjects who don't have a permanent health deprived state.

Considering the factors that account for service availability and conditions, the distance to the hospital, has no impact on the probability of being correct. The most plausible explanation for this result is that the most of the sample live within 10 minutes from the hospital, so we have no variability. . Regarding the factors that enable the person by the community, the waiting time in the PCS seems to negatively affect the probability of hitting the profiles, and, on average, an additional minute in the PCS standby time leads to a decrease in the probability of hitting the profiles -0.05 percentage points, *ceteris paribus*. On the other hand, the longer they wait in the emergency room to be attended to, the more likely they are to be correct. However, this effect seems to be marginal, which will also be interesting to study on another occasion.

In relation to factors that led the subjects to go to the ED, as is the case of trust in the ED, decreases the probability of getting the clinical profiles right. Such fact will be directly related with said placed trust in the ED that leads them to resort to this service in any health situation.

Regarding the need of care, for each additional visit to the family doctor per year, the probability of answering correctly increases 7 percentage points. Thus, a more regular service at PC could contribute to the solution. However, further investigation should explore what is that makes more regular visitors of family doctors more accurate in the evaluation for the severity of the condition.

In addition, variables accounting for whether the respondent has had previously at least one clinical profile has also significant impact on the probability. Having experienced one profile in general has a positive effect. Controlling for the profiles, we conclude that profile 3 (urinary infection) is the least likely to be correctly evaluated.

Conclusions

Analyzing the answers of the experiments, we conclude that there is a significant over-perception of severity, especially in some clinical profiles and, about 50% of respondents that go to ED with non--emergent conditions, when given information on the severity, do change the choice of service. So we propose that correcting the misperception, by increasing health literacy, might potentially reduce inappropriate demand. However, only half of the subjects change the choice of service. So the correction is only part of the solution.

Results reveal that: being a woman seems to positively/negatively affect the probability, depending on the age. In the case of age, as we could see previously, depends on the sex, affecting positively in the case of men. On the other hand, the higher the education level the lower the probability of being correct. Moreover, the fact that a person has a chronic health condition seems to positively affect the likelihood, however, having regular check-ups at the hospital has the opposite effect.

Although the results of this study are only exploratory, some important implications can be drawn: (i) the role of the family doctor; (ii) the importance of health literacy; and (iii) the access to primary care services. Other analysis are possible utilizing the answers from the In the future, it would be important to extend this experiment to the national population, to analyze possible variation of access to care. Moreover, it would be interesting to run a natural field experiment, in emergency rooms in hospitals and PCS to increase the proximity of the experiment to the real world decision.

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