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COMMUNITY PHARMACY: GOING BEYOND DISPENSING PHARMACEUTICALS

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Abstract

The aim of this study is to understand if it is possible to predict health crisis based on biochemical and physiological measurements made at the pharmacy, and, if needed, refer patients to the doctor. This would avoid emergency services and increase pharmacies' income. Three pharmaceutical consultations were made, where these parameters were measured and the therapeutics registered. The short duration of the study (three months) and the small sample (57 patients) did not allow to reach clear conclusions, as patients had little variation in their health. It was also addressed the issue of how important these consultations are for patients and results were positive: they considered consultations important and helpful and the majority of patients were willing to pay €5 or less for them.

Key words: pharmacy, pharmacist, cholesterol, glycaemia, blood pressure, body mass index, abdominal circumference.

1) Introduction

In Portugal, the healthcare system struggles with problems of overuse of emergency services, being, in 2011, the country with higher number of visits to emergency departments across the 21 OECD countries (Berchet, 2015). Pharmacies can represent an important link between people and primary healthcare services due to their proximity to the population. The main goal of this study is to understand if, using pharmacies to follow patients with chronic conditions, it is possible to predict crisis on their health and have an early referral to treatment. If this hypothesis proves to be true, pharmacies could refer patients to the doctor, reducing the affluence to the emergency services (ES). This would be advantageous for everyone: pharmacists would become more integrated on the National Health Service and more valued by

society, pharmacies would find at consultations a new source of income if the state and/or the patients were willing to pay and the state would solve some of the problems related to the high affluence to ES and would reduce costs once treating a patient in a phase of acuteness is more expensive than treating them earlier. Finally, the patient would benefit because consultations would improve life's quality and provide a better healthcare service. This following of patients may allow the pharmacist to detect a worsening of patient's clinical situation and, either treat minor situations or refer major situations to the doctor.

To conduct the study, monthly pharmaceutical consultations were implemented as part of the project, so that all patients could have a close and regular following of their clinical situation. At these consultations, patients registered all their medication and measured the following physiological and biochemical parameters: glycaemia, cholesterol, blood pressure and height/weight. The data analysis consisted on looking at patients with a change of medication and on making a retrospective analysis of their parameters to understand if there was a cause-effect relationship. If it is possible to prove a relationship between a variation on these parameters and a future change on medication, pharmacists could detect crisis situations in advance. These consultations will be fully detailed at the section "More about biochemical and physiological measurements". This study also measured how differently patients felt their health related quality of life (HRQOL) through the application of an EQ-5D questionnaire. This questionnaire is the most used generic instrument to measure HRQOL and it can be compared across diseases (Office of Health Economics), which is important at this study once we are comparing patients with different conditions. It consists on five questions, each one corresponding to one dimension: Mobility (MO), Personal Care (PC), Usual Activities (UA), Pain/Discomfort (PD) and Anxiety/Depression (AD). For each dimension, there are three levels of severity experienced or felt by the individual: no problems (level 1), some problems (level 2) and extreme problems (level 3). Thus, this system allows to describe a total of $3^5 = 243$

different states of health (Ferreira et al., 2013). At the end, the respondent is asked to attribute a punctuation based on her/his own assessment of her/his health through a visual analog scale from 0 (worst imaginable health state) to 100 (best imaginable health state) - EQ-VAS thermometer. The EQ-5D questionnaire was included in this study in order to understand if the changes on the values of clinical measurements and/or the changes on medication were reflected on the way that patients felt their own health. Three more questions were added about whether patients attended the doctor and what was the outcome of that consultation, so that we could detect if there was a change on medication (see appendix 1). Moreover, each patient's pharmacotherapeutic profile was registered. This study created on patients the routine of consultations and the routine of talking to the pharmacist about their diseases.

At the third and last phase of the study, it became possible to notice that no results were being obtained, because there were no variations on patients' health. As it was not possible to extend neither the study nor the sample, it was interesting to understand patients' opinion about consultations. In other words, we decided to look for the benefits of consultations other than try to predict sickness episodes. Thus, a final questionnaire was built to apply after the third consultation. This questionnaire was composed by 8 questions in which patients had to classify the consultation: how useful it was to understand their disease, how it made them feel about their disease, what changed on their daily life and how important/trustable the pharmacy and the pharmacist were. They also had to classify the importance of measuring each one of the biochemical and physiological parameters and state whether they were willing to pay for consultations (reasons and value) or not.

As a pharmacist and a manager, I had a huge motivation to conduct this study. I think it is important that, as well as in other countries, Portuguese pharmacies are more integrated on the healthcare system and that the pharmacist is recognized as a healthcare professional that is qualified to diagnose and/or refer patients when faced with certain signs and symptoms.

Moreover, for regular patients, pharmacies have the history of the whole medication (that each doctor who the patient attends prescribes) and supplements that patients do.

As a manager, I found important to understand how could society value the pharmacist and the pharmacy and what tangible and non-tangible benefits could the pharmacy have from it. After this study, it became very clear that the implementation of these consultations requires changes on the management of the pharmacy. The most crucial aspect is that an available pharmacist is needed and the fact that the pharmacist is making consultations has an associated opportunity cost, once she/he is not available for other tasks. Thus, it is not possible to have consultations during all business hours. It is necessary to reorganize tasks so that the fact that the pharmacist is on consultation does not harm the normal functioning of the pharmacy.

Regarding the organization of this work, section 2 represents the background for the study. Section 3 explains the study, its procedures and results, as well as the conclusions that can be taken.

2) Background

a) The pharmacy and its community

The pharmacy is usually the most accessible healthcare facility to patients. Therefore, they attend pharmacies more regularly than they attend the doctor. Traditionally, patients used the pharmacy to get medication (prescription and over the counter (OTC) drugs (see "Glossary")) and/or to get advice for its use. This narrow definition of the role of the pharmacy is slowly changing (Barros et al., 2015). The proximity between the pharmacist and the population allied to the pharmacist' experience with drugs (formulation, chemistry and pharmacology) allows building a relation of confidence, making the pharmacy a healthcare point where a healthcare professional can easily connect to the population. Ana Paula Martins, Portuguese Pharmacists Association' President, has herself stated: "Pharmacists are

indispensable for the survival of the healthcare system with phenomena such as the growing of aging population, (...). Pharmacists are essential in preventing the disease (...)" (Ana Paula Martins 2016a, 2016). She also defended on an interview on a Portuguese TV channel that her priority is to assure that the SNS ("*Serviço Nacional de Saúde*", Portuguese Healthcare Service) becomes sustainable and that all health professionals - pharmacists, physicians, nurses - work together to prevent disease, promote health and treat patients better and better (Ana Paula Martins 2016b, 2016). Her point of view follows the rest of the Europe. For instance, the "European Pharmacist Forum" released a white paper called "The role of pharmacy in supporting the public's health" which states European real examples of how pharmacies make the difference in areas such as "Improving adherence to medicines", "Screening for early identification of disease" and "Providing public health services to prevent diseases". According to these facts, the European Pharmacist Forum asks for the collaboration of health systems and governments together with pharmacists in order to improve the pharmacy role on society (European Pharmacist Forum, 2015).

b) The reality of the system

Portuguese pharmacies went through a huge economic and financial crisis in the past few years. Pharmacies were targeted in several economic and legislative measures which either increased the sector's competition and reduced the profitability of the pharmacies: it was allowed to sell OTC drugs outside pharmacies (Decree-law 134/2005 of August 16); the price of drugs reduced continuously (Decree-law 65/2007 of March 14); it was allowed to make discounts on medication (Decree-law 65/2007 of March 14); the property of pharmacies was liberalized (Decree-law 307/2007 of August 31) and regressive margins on drugs were implemented (the margin decreases as the price increases) (Decree-law 112/2011 of November 29).

In order to react to this new environment, pharmacies had to change their focus and, instead of focusing only on selling drugs, they started focusing on patients' care. On the other hand, the SNS is always fighting against limited resources at hospitals and health centers, which are in the majority of time with a lot of waiting patients and huge waiting time.

c) UK example

At the UK, something similar is already being done: "Community pharmacists are also taking on more of the clinical roles that have traditionally been undertaken by doctors, such as the management of asthma and diabetes as well as blood pressure testing. They also help people give up smoking, alter their diets to make them healthier and advise on sexual health matters" (Royal Pharmaceutical Society a, 2016). Moreover, one of the career options for pharmacy in the UK is Primary Care Pharmacist, which has an important role on "preventing people from becoming ill and encouraging healthier lifestyles so as to keep them out of hospital" (Royal Pharmaceutical Society b, 2016).

There are some entities such as the American Heart Association, the British National Health Service, the Canadian Medical Association along with the Canadian Pharmacist Association, and others that are valuing the role of the pharmacist in preventive medicine (Tsuyuki et al., 2002). There is evidence of successful preventive health programs in chronic diseases executed by pharmacists (Tsuyuki et al., 2002).

d) More about biochemical and physiological measurements

Measuring biochemical and physiological parameters has long been part of functions of a pharmacy. In the past, pharmacies had clinical laboratories incorporated but, with the change of the legislation in the past century, they had to be separated. Since then, only simple measurements with capillary blood are made at the pharmacy (the most common are cholesterol, glycaemia, uric acid, hemoglobin, PSA (prostate-specific antigen), blood pressure and BMI (body mass index)). This blood is obtained through a small puncture on the finger.

Then, specific and calibrated devices are used in order to get reliable results. Usually, the initiative to make these measurements come from patients when they think that something may not be normal with their health. Only a few people have regular monthly measurements. These measurements can be made by a pharmacist or by a pharmacy technician, and they should be made on a reserved area of the pharmacy (there is usually a patient's cabinet), so that patients feel comfortable. The consultations of the study followed the structure of a usual pharmaceutical consultation. They started with a brief talking about how the patient felt, if he/she had gone to the doctor and if there were any doubts related to the medication or to any health-related topic. At this point, the changes on medication were registered, if applicable. The measurement of the parameters started by blood pressure, as this was the moment where the patient was less anxious (after the conversation and before the puncture of the finger). Then, the other measurements were made. We analyzed the results of parameters and we made the counseling according to DGS' guidelines or, if needed, the referring to the doctor. To finish consultations, we applied the questionnaire(s).

As mentioned before, these services are already made at the pharmacy and have the purpose of following up patients and evaluating the need to referring to a medical consultation. Usually, each biochemical parameter is specific for a certain organ or disease and its variation works as an indicator for a certain condition. In the "Glossary", there is a brief characterization of the biological and physiological parameters measured, as well as an explanation of the values that are considered as normal, is reported. The importance of these parameters is presented below.

- i) **Cholesterol** – The excess of this molecule greatly affects human health as it is involved in several conditions such as atherosclerosis (see "Glossary"). The fact that it is produced endogenously makes cholesterol levels very difficult to control without medication. The pharmacy can play an important role either in controlling its values and in the premature detection of high levels of cholesterol. The pharmacist can counsel non-pharmacologic

therapeutics such as the adoption of a healthy lifestyle, through the loss of excess weight and regular exercise. Studies show that pharmacies have an important role in helping high-risk patients to control the levels of cholesterol (Tsuyuki et al., 2002) (Simpson et al., 2001).

ii) Glycaemia –The most common disease related to glucose levels is diabetes (see “Glossary”). The regular measurement of glucose allows predicting any inadequate adherence to medication regimens. Studies show that, at pharmacies, the education of patients about their medication and about the importance of the correct adherence to the treatment, allied with glycemic control, lead to an improvement in diabetes management (Farsaei et al., 2011) (Butt et al., 2016) (Alhabib et al., 2014).

iii) BMI (Body mass index) –This ratio does not measure directly body fat and it does not give information about fat distribution either. Moreover, this index has two limitations. The first one is the overestimation for athletes that have a higher muscular mass: as the majority of the weight comes from muscle, the person has lower CV risk than the BMI calculate. The second one is the underestimation in elderly or people with physical disability, because usually people loose muscle as they get old or due to some conditions: as the majority of the weight comes from fat, the person has more CV risk than the BMI calculate.

iv) Abdominal circumference - It is proved that it is much more dangerous when the fat is in the abdominal area than when it is in any other location (Fujioka et al., 1987). The abdominal fat determines the risks of developing certain conditions such as cardiovascular disease and type 2 diabetes (Després, 1993). Studies have shown that either abdominal circumference and BMI work as indicators for the distribution of body fat and are associated with metabolic and cardiovascular diseases (Janssen et al., 2004) (Zhu et al., 2004) (Rezende et al., 2006), namely hypertension (Sarno and Monteiro, 2007). These parameters can have different applicability that goes from the need for changing weight, to the evaluation of the cardiovascular risk or the monitoring of chronic diseases such as diabetes or hypertension (DGS a, 2013). The pharmacy

has an important role in evaluating BMI and abdominal circumference and in following its patients according to their needs.

v) **Blood pressure** – When we are towards high blood pressure, we call it hypertension. Hypertension is responsible for premature morbidity and mortality: “It represents a major risk factor for ischemic and hemorrhagic stroke, myocardial infarction, heart failure, chronic kidney disease, cognitive decline and premature death” (Williams, 2011). It is a very difficult disease to manage. In the majority of times the cause is unknown, which makes the treatment more difficult. However, even a small decrease in blood pressure brings great results: studies show that a decrease of 10 mm Hg in systolic blood pressure decreases the episodes of stroke in 41% (Law et al., 2009), and a decrease of 5 mm Hg in systolic blood pressure may decrease stroke mortality by 14% and coronary mortality by 9% (Stamler et al., 1989). Moreover, for values from 115/75 mmHg, cardiovascular risk doubles each time systolic blood pressure increases 20 mmHg and diastolic blood pressure increases 10 mmHg (DGS a, 2011). Studies show that the pharmacist following hypertensive patients succeed on a better control of the blood pressure. Patients improve their knowledge about the disease and how to treat it and recognize with high satisfaction the pharmaceutical service (Gums et al., 2015) (Nemerovski et al., 2013). The higher the contact between the pharmacist and the patient, the lower the diastolic blood pressure achieved (Zillich et al., 2005). Another area of intervention of the pharmacist is patient’s lifestyle. These interventions should be integrated on the treatment of the disease and the main important areas are the adoption of a balanced diet, the practice of regular physical exercise, weight control, the restriction of excessive alcohol consumption, reduction of salt intake and the cessation of tobacco use (DGS a, 2011).

3) Study

a) Objective

As mentioned before, this study started with the objective of measuring the possibility to predict changes on patients' medication and/or health condition based on the evaluations that can be made at pharmacies. However, as no clear conclusions could be taken due to its limitations of duration and sample size, it became interesting to look at the problem from a different perspective and understand how patients valued consultations (more detailed information on "Introduction"). It is important to notice that, according to Section II of the Code of Ethics of the Portuguese Order of Pharmacists, pharmacists are bound by professional secrecy concerning all facts that they have knowledge in the exercise of their profession, with the exception of the cases provided by law. It is also important to notice that the objective of this study was never to substitute the doctor but to work in association with him instead.

b) Methods

- i) **Setting:** The settings for this study were two community pharmacies in Alentejo, Portugal. One located in Beja and the other one located in Serpa. As they were part of the study, consultations to patients were unpaid. All patients signed an informed consent in order to participate in the program. The data collected was confidentially treated.
- ii) **Participants:** Patients were selected between the pharmacies' clients that entered at the pharmacy between the 15th and the 19th of February 2016, and that had, at least, one of the following diseases: hypertension, diabetes, hypercholesterolemia or eating disorder. We approached every patient and the ones who had one of the required diseases and accepted the study were automatically included. This selection is considered random once we had no choice about who entered the pharmacy on those days. Sixty six patients from the two pharmacies were selected: 31 at Serpa and 35 at Beja (approximately 28% and 25% of the patients approached, respectively). The patient was considered eligible when she/he entered the

pharmacy to buy her/his own medication related to one of these diseases. Patients were given a code according to the position of enrolment (1, 2, ..., 35) and the city of the pharmacy (S=Serpa and B=Beja).

iii) **Intervention:** The study consisted on three pharmaceutical consultations (see consultation form on Appendix 1 and “Introduction” for more detailed information about consultations and questionnaires).

iv) **Design:** This study is considered a case study.

v) **Inclusion criteria:** As explained in the section “Participants”, patients were selected for the study based on their health condition. In order to be included in data analysis, patients had to attend all three consultations.

vi) **Study timeline:** Both pharmacies started on February 2016 and finished on April 2016.

vii) **Data sources:** Data was obtained during the consultations. At the first consultation, pharmacists registered demographic data from patients as well as their medication (patients were asked to bring the boxes of every pill they were taking). In the following consultations it was only registered the medication changes, if any. Clinical data was collected from the results of biochemical and physiological tests. The other data (questionnaires) was collected at each consultation with the help of the pharmacist. This method was chosen as some patients were not able to read and the adopted procedure ensures uniformity of situations.

viii) **Data analysis:** In order to make the analysis, the data from both groups (Serpa and Beja) were combined so that we get a bigger sample.

c) Results

Regarding participants, there were 9 who drop out, meaning that only 57 patients finished the study. The reasons given by patients when we called to remember consultations included impossibility of scheduling (6 patients), a broken leg (1 patient) and lack of interest in consultations (2 patients). The average age was 67,9 years and approximately 72% of

participants were women. Table 7 (appendix 2) presents the main characteristics of participants. Approximately 89% of patients had 50 or more years and the more common chronic diseases were hypertension (64,9% of participants) and hypercholesterolemia (59,6% of participants).

In what concerns physiological and biochemical parameters, average values per consultation, as well as standard deviation, maximum and minimum values are presented on table 8, appendix 2. It is important to understand that the average has the disadvantage of being very sensitive to extreme values. Thus we need to analyze not only the average, but also the standard deviation, the maximum and the minimum. The standard deviation gives us how dispersed data is relatively to the average. For instance, if the average value is getting closer to optimal values and the standard deviation is decreasing, it means that the data is funneling and results are positive. Otherwise, if the average is getting closer to optimal values but the standard deviation is increasing, it means that there are values that are getting closer the optimal but others are deviating. Thus, it is important to analyze the data as a whole. In this case, as we have no significant changes on values and we cannot observe a tendency, no conclusions can be taken. The detailed distribution of patients, according guidelines, per parameter per consultation is on table 9, appendix 2. We will now analyze each parameter and its evolution (more detailed on graphics 1 to 57, appendix 3 and 4).

- **BMI:** we can observe that the percentages of patients with normal BMI (20%), pre-obesity (45%) and obesity (35%) have only slight variations. We had no participants with BMI lower than 18,5 (thinness).
- **Abdominal circumference:** this parameter has different reference values for man and women, which required separated analysis. The majority of participants (approximately 90% of women and 50% of man) had their abdominal circumference considered as “greatly increased” by the guidelines (see “Abdominal Circumference” on “Glossary”).

- **Blood Pressure:** as mentioned before, 65% of patients had hypertension as one of the diagnosed chronic diseases. Regarding systolic blood pressure, 51% to 65% of participants presented values at levels of hypertension, whereas for diastolic blood pressure only 3% to 16% of participants reached hypertension values.
- **Glycaemia:** among participants, 28,1% were already diagnosed with diabetes. When analyzing results, we verified that around 80% of patients had glycaemia values within the normal range. We only had two patients in hypoglycemia (first consultation). We can observe that glycaemia values did not change much in time.
- **Cholesterol:** as mentioned before, almost 60% of patients had diagnosed hypercholesterolemia. Analyzing results, 35% (first consultation) to 49% (third consultation) of participants presented normal value of cholesterol.

Analyzing now the **EQ-5D questionnaire**, if we look at the 5 different dimensions (table 10, appendix 5), we can observe that the dimensions Mobility (MO), Self-care (CP) and Usual Activities (AH) have the majority of results on level 1 (no problems). Yet dimension Pain/Discomfort (DM) has the majority of results at level 2 (some problems), and dimension Anxiety/Depression (AD) has its results almost equally divided between level 1 and 2. In order to analyze the EQ-5D, it is necessary to apply the formula $V=1-\alpha \cdot MO-CP-AH-DM-AD-N3$, in which “V” represents the health state; 1 represents the value of the perfect health and is used to rescale the final result on the interval from 0 to 1; α is a constant that represents the non-coincidence of the value of any dimension to level 1; N3 is a constant which represents the presence of level 3 in any dimension and variables MO, CP, AH, DM and AD assume the values given by the table 11, appendix 5 for the respective level of any dimension (Ferreira et al., 2013). Study’s average “V” (health state) is 0,667. Analyzing results of the three phases (more detailed on appendix 6, sheet “EQ-5D”), we can observe that the average subjective health state has improved 0,001. The dimensions Mobility and Pain/Discomfort had an average

improvement of 0,002 and 0,006, respectively. All the other 3 get worse: Self Care and Usual Activities decreased on average 0,002 and Anxiety/Depression decreased, on average, 0,007.

Looking at the results of the **EQ-VAS thermometer**, we can observe an increase of 1,8 points on average subjective general health state (appendix 6, sheet “EQ-5D”).

Finally, in what concerns the **final questionnaire** (appendix 6, sheet “Final questionnaire”), when faced with questions about how patients felt that the consultation was beneficial to understand and deal with their diseases, how they felt that these consultations were important and how they trusted on the pharmacy and the pharmacist, participants’ answers were, on average, higher than 4,3 on a scale from 1 (“Completely disagree”) to 5 (“Completely agree”). When asked about how important the measurement of each parameter was, respondents classified, on a scale from 1 (“Not important”) to 6 (“Very important”), as presented on table 1:

Table 1 - Importance of each parameter measurement

	Cholesterol	Glycaemia	Height/weight	Abdominal Circumference	Blood Pressure
Mean	5,93	5,72	5,11	5,14	5,91

Cholesterol and blood pressure were considered as the most important by patients while height/weight were classified as the less important. When asked if they were willing to pay for consultations, 77% of respondents gave a positive answer and, when faced with values, the results were the ones presented on table 2. From the 13 respondents that were not willing to pay for consultations, 9 (≅69%) would pay if the state copays, even though the values proposed as possible contribution by patients were the same in both questions. The amount that patients were willing to pay with the State’ copayment is presented on table 2. Table 3 describes the reasons why patients were not willing to pay for consultations, being the main reason the fact that the money is needed for other expenses.

Table 2 - Amount (€) willing to pay for consultations Table 3 - Reasons not to pay for consultations

	Amount	Amount willing to pay if the State copays
<€5	56,8%	71,7%
€5 - €10	34,1%	24,5%
€10 - €15	2,3%	1,9%
>€15	6,8%	1,9%

States' obligation to pay	Consultations are not that important	The money is needed for other expenses	Other
23%	8%	62%	8%

Finally, 100% of respondents would recommend this consultation to a friend for five euros, even the ones that were not willing to pay for it. All results are detailed on appendix 6.

d) Discussion

The results of parameters did not show significant differences between consultations of the same patients. These results show a stable health on patients being followed at consultations. However, we can not make conclusions about what would have happened if no following was being made. Regarding **BMI and Abdominal Circumference**, unless some rigorous diet was being made or the patient had some condition that affected weight, these parameters would hardly have substantial changes in three months. **Blood pressure** is a parameter that is very sensitive to external factors, such as anxiety and air temperature (the blood pressure decreases when the temperature increases). These are some of the reasons why one isolated measure cannot be diagnosis of hypertension. In order to analyze blood pressure, consultations should be more frequent for patients with high values. **Glycaemia** is usually a parameter that is within the range of normal values once either hypo or hyperglycemias have associated symptoms, making patients look for the doctor. The group that needs more careful attention is diabetic patients. The patients that we had with glycaemia values considered as diagnosis of diabetes were only diabetic people. We had some patients with pre-diabetic values and no diagnosed disease, which made important the repetition of the test and the eventual referral to the doctor. One of these patients was diagnosed with diabetes, by his doctor, one month after the beginning

of the study (participant 6S). **Cholesterol**, unlike glycaemia, is a parameter that is not associated with any symptoms. This is the reason why so many patients are across the “red line”. We can observe a decrease of 22,4 points on average cholesterol during the study. It would be interesting to understand if this improvement on cholesterol values is related with the pharmacist counselling people to change their habits (eating and physical activity).

Regarding **EQ-5D questionnaire**, results showed only little improvement between consultations, which can be related to the fact that there were no significant changes on health state. If we look at **Thermometer** results, we can also observe little improvement on the subjective self-assessment which is, in principle, related with the slight increase on EQ-5D results.

The **Final questionnaire** showed that, despite the fact that no significant improvements happened on general health state, patients valued these consultations and were willing to pay for them. It is interesting that all participants, even the ones that would not pay for consultations, would recommend a friend to pay. This means that they either value these consultations or that they believe that their friends would. The majority of patients were willing to pay less than €5 euros. Considering €1500 as an average salary for a pharmacist and €3,30 the costs of the material used to measure parameters (glucose and cholesterol strips, gloves and lancet), the costs of a 15 minutes' pharmaceutical consultation is €5,64. Thus, the price that patients were willing to pay would barely cover the costs. When looking at the questionnaires' results we cannot ignore that some bias can exist once the questionnaires were made face-to-face by the pharmacist. This could intimidate the patient to respond that she/he did not consider consultations important or the pharmacist as a trustable health professional. The fact that 100% of patients would recommend the consultation to a friend provides a cross-check. In other words, if the patient claims needing the money for other expenses, this could mean that she/he does not see consultations as that important but is intimidated to say it. However, the fact that

she/hhe would recommend them to a friend can show that they see some value in consultations. In the other hand, when someone is being asked a question, there is a tendency for answering in the interviewer's benefit, even if that is not true. This means that patients could have answered that they would recommend consultations to avoid embarrassment by telling the truth.

It is also important to look at results and understand, from a manager point of view, implications and benefits that these consultations would have. On the one hand, it would be an added value to the pharmacy. There are no pharmacies on the region making consultations, which would be a differentiation factor. Pharmacies would become top-of-mind in the region for professionalism and competence. On the other hand, these consultations would bring a great responsibility for the pharmacists: continuous learning and training of the pharmacists would be needed, which would have some costs associated. Moreover, and maybe the most difficult change, would be the scheduling. It is very difficult to schedule an hour with patients and the pharmacist to be available at that time. The solution would be to limit consultations to the hours with less work at the pharmacy (between 2pm and 3pm) and redistribute some tasks of the pharmacist by the other workers of the pharmacy. Regarding the amount to charge for consultation, if it is possible to organize the team in a way that the pharmacist is available, the opportunity cost of being at the consultation is zero, so it can be charged the €5 that the majority of patients are willing to pay. However, if the pharmacist has other tasks to do at that hour, it is necessary to calculate their opportunity cost and understand if patients would be willing to pay that price.

e) Limitations

This study presented a few limitations. The **first** one was soon detected when I started trying to schedule the consultations with patients. It turned out being so hard to schedule that it became difficult to implement the four-week interval between consultations. This first limitation made impossible to conclude the fourth phase of the study. The **second** limitation was related to the

time spent at each consultation: each patient took around 15 minutes, which makes a total of 900 minutes or 15 hours per month. This means that during the time that the pharmacist was doing the consultations she/he could not be doing her/his job. I had to redistribute functions by other workers with the problem that one of the teams was with two workers on a sick leave and both teams were with workers on holidays. The whole team had to adjust and work harder. The **third** limitation of the study was its duration: three months is very few time to detect changes on the health of people that is stable with the medication.

f) Conclusion

This study had the objective to understand if it would be beneficial for either pharmacists, pharmacies, healthcare system, doctors and patients the use of community pharmacies to decrease the affluence to emergency services. The results of this study were not conclusive due to its limitations: difficulty of scheduling pharmaceutical consultations, reorganization of tasks with the pharmacy team and the fact that either the sample (57 patients) or the duration (3 months) of the study were small. However, through the implementation of a final questionnaire, it was possible to understand that patients felt these consultations as useful and that they were willing to pay for them. In fact, 100% of patients (including the ones that were not willing to pay) would recommend a friend to pay €5 for a consultation. This showed that patients valued this service. I would suggest the application of this study in a bigger number of pharmacies for a period of, at least, one year to understand if a cause-effect relationship can be made.

Looking from the point of view of the pharmacy' manager, the implementation of these consultations requires some adjustments. Firstly, it is important to reorganize. Secondly, these consultations should be scheduled at the hour of lowest traffic at the pharmacy so that the team is freer if unexpected events occur. Thirdly, it is important to understand how much it should be charged for consultations. Making this in a way that does not harm the daily work, it would increase pharmacy recipes, even charging the €5, once the opportunity cost of not doing it is

zero. The manager has to balance how consultations can benefit the pharmacy (in terms of clients trust and marketing) and how much money is she/he losing with each consultation. Making these calculations, the manager opt by implementing or not the service.

It is very important to notice that the objective of this study was not, at any point, to substitute the doctor. The objective is to detect “red lights” on a patient’s health in order to refer her/him to the doctor to get a medical evaluation before the situation gets worse, which could require going to the emergency services. The goal is that the National Health Service works together and doctors and pharmacists increase their communication in order to improve the well-being of their patients.

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Acronym List

- **AD** – Anxiety/Depression
- **BMI** – Body Mass Index
- **CV** - Cardiovascular
- **ES** – Emergency Services
- **HRQOL** – Health Related Quality of Life
- **MO** – Mobility
- **OECD** – Organization for Economic Cooperation and Development
- **OTC** – Over-the-counter
- **PD** – Pain/Discomfort
- **SC** – Self-care
- **SNS** – Portuguese Healthcare Service (“*Serviço Nacional de Saúde*”)
- **UA** – Usual activities

Glossary

- **Abdominal circumference** - measure of the perimeter of the abdomen. This measure should be made with a tape-measure around the middle after breathing out (DGS a, 2013). The reference values are (DGS a, 2013) (DGS, 2004):

Designation	Cut-off point	Risk of metabolic complications
Abdominal circumference	>94 cm (M) ; >80 cm (W)	Increased
Abdominal circumference	>102 cm (M) ; >88 cm (W)	Greatly increased
Waist/ hip ratio	≥0,90 (M) ; ≥ 0,85 (W)	Greatly increased

M= man; W=woman

Table 4 – Abdominal circumference reference values

- **Atherosclerosis** - systematic condition that consists on the constriction of arteries with fat, reducing the blood flow and improving the chances of a clot formation that can lead to peripheral vascular disease (legs), myocardial infarction or stroke.
- **Blood pressure** - Pressure that the blood applies to the vessels. According to guidelines, hypertension is defined as persistent elevation in various measurements and on different

occasions of systolic blood pressure (SBP) greater than or equal to 140 mmHg and/or diastolic blood pressure (DBP) greater than 90 mmHg (DGS b, 2013). The clinical algorithm/decision tree for hypertension diagnosis is de following (DGS b, 2013):

SBP	< 120	120-129	130-139	140-159	160-179	≥180	≥140
	and	and/or	and/or	and/or	and/or	and/or	and
DBP	< 80	80-84	85-89	90-99	100-109	≥110	<90
Classification	Optimal	Normal	Normal-high	HT Grade I	HT Grade II	HT Grade III	Isolated systolic HT

Table 5 – Blood pressure reference values

- **BMI (Body mass index)** - ratio between weight (w) and height (h). It is calculated trough the formula $BMI = w(\text{kg}) / h^2(\text{m})$. Usually, the higher the BMI is (the higher is the weight for a certain height), the higher the risk for metabolic and cardiovascular disease. This happens

Table 6 – BMI reference values

Designation	BMI (kg/m ²)	
		Thinness Class
Severe thinness	< 16	III
Medium thinness	16-16,99	II
Moderate thinness	17-18,49	I
Normal	18,5 – 24,9	Normal weight
Overweight	25 – 29,9	Pre-obesity
		Obesity Class
Obesity	30 – 34,9	I
Obesity	34,9 – 39,9	II
Extreme obesity	≥ 40	III

because higher weight is associated with higher fat. The DGS interpretation of the results is made according to the World Health Organization (WHO) and is presented on table 4 (DGS a, 2013).

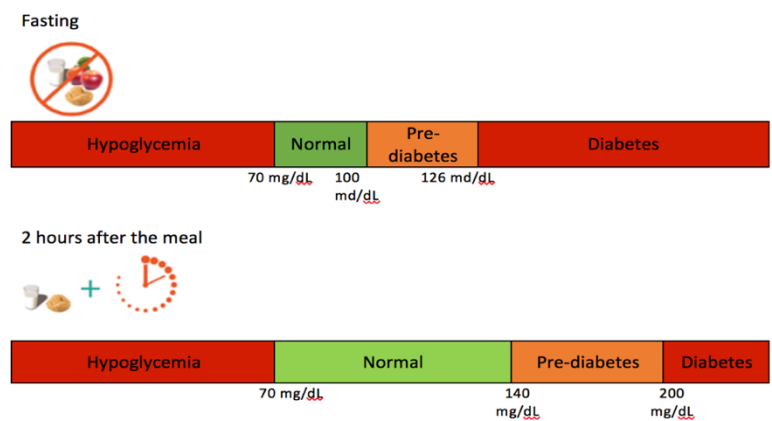
- **Cholesterol** – Type of lipid that is obtained either through food either through endogenous synthesis. The amount of cholesterol that is synthetized by our organism is enough to cover our body needs. Regarding its functions, the cholesterol plays an important role in several essential physiological functions, such as the support of the cell membranes, the production of steroid hormones, vitamin D and bile. DGS’ guideline 019/2011 (DGS a, 2015) considers as desirable a total blood cholesterol level lower than 190 mg/dL for patients with low to medium CV risk and lower than 100 mg/dL for patients with high CV risk.
- **Diabetes** – metabolic disease characterized by an increased concentration of blood glucose. Diabetes can result from excessive release of glucose from the liver cells to the plasma, usually

due to an abnormality in insulin secretion (type 1 diabetes), or due to an increased resistance of the cells to insulin (type 2 diabetes).

- **Glycaemia** - The term “glycaemia” refers to the level of glucose (sugar) in the human body. The glucose is obtained through the diet and it is important that its levels remain within a narrow range so that it avoids either hypo and hyperglycemia. The regulation of these levels according to the needs of the body is made thanks to insulin and glucagon that are secreted according to the concentration of glucose in the plasma. After the diagnosis of diabetes doctors prescribe medication to avoid either hyperglycemias or long term complications such as cardiovascular disease that, in 75% of cases, represents the cause of death (DGS b, 2015).

The diagnosis of diabetes cannot be made if only one single abnormal value is registered (DGS b, 2011). APDP (“*Associação protectora dos diabéticos portugueses*” - Protective association of Portuguese diabetics) has a simple

Figure 1 - Glycaemia reference values



scale (figure 2) that explains the reference values (APDP 2016). This scale was made using references as the WHO (world health organization), DGS guidelines (DGS b, 2011), among other sources.

- **OTC (Over-the-counter drug)** – medication that does not need medical prescription to be bought.