BMJ Open

Evaluation of beliefs and representations of chronic treatments of patients hospitalized in medicine and vascular surgery

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2023-073250
Article Type:	Original research
Date Submitted by the Author:	21-Mar-2023
Complete List of Authors:	Kotry, Dounia; University Hospital Centre Nantes, Saillard, Justine; CHU Nantes, Pharmacy Bonsergent, Marion; CHU Nantes, Pharmacy Benichou, Antoine; CHU Nantes, Internal Medicine Prot-Labarthe, Sonia; Nantes Université, Pharmacie; ECEVE HUON, Jean-François; University Hospital Centre Nantes, Clinical Pharmacy; University of Nantes, Faculty of Pharmacy, Clinical Pharmacy department
Keywords:	Patient-Centered Care, CLINICAL PHARMACOLOGY, Patient Reported Outcome Measures

I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our licence.

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which Creative Commons licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Evaluation of beliefs and representations of chronic treatments of patients hospitalized in medicine and vascular surgery

Dounia KOTRY[1], Justine SAILLARD[1], Marion BONSERGENT[1], Antoine BENICHOU[2], Sonia PROT-LABARTHE[3], Jean-François HUON[4]

University degree:

Dounia KOTRY, PharmD

Justine SAILLARD, PharmD

Marion BONSERGENT, PharmD

Antoine BENICHOU, MD

Sonia PROT-LABARTHE, PharmD, PhD

Jean-François HUON, PharmD, PhD

Affiliations:

1. Nantes Université, CHU Nantes, Pharmacie, F-44000, France

2. Nantes Université, CHU Nantes, Médecine interne, F-44000, France

3. Nantes Université, CHU Nantes, Pharmacie, F-44000, France, Université Paris Cité, INSERM, ECEVE, F-75010 Paris, France

4. Nantes Université, Univ Tours, CHU Nantes, CHU Tours, Pharmacie, INSERM, MethodS in Patients-centered outcomes and HEalth Research, SPHERE, F-44000 Nantes, France

Corresponding author:

Dounia KOTRY, dounia.kotry@gmail.fr

Mails:

Justine SAILLARD: justine.saillard@chu-nantes.fr

Marion BONSERGENT: marion.bonsergent@chu-nantes.fr

Antoine BENICHOU : antoine.benichou@chu-nantes.fr

Sonia PROT-LABARTHE : sonia.protlabarthe@chu-nantes.fr

Jean-François HUON: jeanfrancois.huon@chu-nantes.fr

Abstract

Context: Today, the involvement of patients in their care is essential. As the population ages and life expectancy increases, the number of patients with chronic diseases is increasing. In the medical and vascular surgery departments, patients are polymedicated and mostly suffer from several chronic diseases. Approximately 50% of patients with a chronic disease are not adherent. Among the factors that can influence therapeutic adherence are the beliefs and representations of patients.

Objectives: To evaluate the beliefs and representations of chronic treatments in patients with multiple medications and hospitalized in a vascular medicine and surgery department, and to evaluate the compliance, the knowledge, and the importance patients attach to their treatments.

Design: This was an observational, prospective and a single-center study.

Setting: The study was conducted in a French tertiary hospital center of around 3000 beds in 9 institutions.

Participants: Hundred patients were included. Patients included had to be over 18 years of age, hospitalized in the surgical and vascular medicine department and polymedicated.

Methods: Patient interviews were carried out in the department and were based on three hetero-questionnaires (a global questionnaire, the BMQ and the GIRERD).

Results: Our study showed that patients perceived their treatments as beneficial rather than worrying. A correlation between compliance and beliefs was observed. "Non-compliant" patients had a more negative overall view of medication than "compliant" patients. The level of compliance and knowledge of our patients was low. Only 11% of the patients were "good observers", 16% of the patients could perfectly name their treatment and 36% knew all the indications.

Conclusion: Knowledge of treatment representation and beliefs are central to understanding patient behaviour. Considering patients' representations will allow the identification of levers,

and the development of actions and educational tools adapted to improve their adherence, their knowledge and therefore their drug management.

Data availability statement: Data are available upon reasonable request

Strengths and limitations of this study

- This study aimed to explore the representation and beliefs of chronic treatments in patients with multiple medications and cardiac pathologies in a vascular medicine and surgery department, which, to our knowledge, has not been previously investigated.
- One hundred patients were included in the study, providing a comprehensive sample of the patient population.
- However, it is important to note that this is a single-center study, which may limit the generalizability of the findings to other settings. Future research in other centers is needed to ensure the transferability of results.
- Moreover, the evaluation of knowledge in this study may have been impacted by the hospitalization of the patients. The environment of the hospital and the stress of being hospitalized may have affected patients' true understanding of their treatment.

Introduction

According to the World Health Organization (WHO), a chronic disease is a long-term condition that usually progresses slowly and requires long-term treatment and care. It is also characterized by its impact on the quality of life of patients. Twenty million French people are affected by a chronic disease (1). They represent 77% of all diseases, the most important of which are cardiovascular, cerebral, respiratory, metabolic and cancerous diseases (2). Today, the prevalence of chronic diseases is rising sharply and can be explained by the aging of the population and the increase in life expectancy. They are therefore among the most common health care problems, with a major impact on public health and the economy (3).

In vascular medicine and surgery, the majority of patients have one or more chronic diseases and are polymedicated (4). Polymedication is defined as "the administration of many drugs simultaneously or the administration of an excessive number of drugs" (5,6). Furthermore, all chronic diseases require long-term management with an investment by both healthcare professionals and the patient. For this, a good level of information on the disease and treatments is necessary for the patient to avoid the risks of poor compliance. According to the WHO, 50% of patients do not adhere to their chronic treatment, even though this adherence is essential for the control of the chronic disease. Indeed, loss of adherence to treatment leads to a decrease in

therapeutic efficacy and exposes the patient to complications of their disease and to therapeutic failure (7).

Among the factors that influence therapeutic adherence, can be found the representations of treatments (8). This refers to each individual's knowledge, explanations and ideas about his disease. Representations are linked to the patient's behaviour, cultural, social and family background, education, professional activity, etc. (9). They have multiple origins and varies from one individual to another. Today, the representation of the disease, but also of treatments, is central to understanding the behaviour of patients in their health care journey. Representations and beliefs have been studied in certain chronic diseases, notably HIV, diabetes, hypertension, asthma, etc. (9-12).

However, to our knowledge, they have not been studied in the medical and vascular surgery fields, when it comes to hospitalized patients with multiple medications.

The main objective of this study was to evaluate the beliefs and representations of chronic treatments in multi-medicated patients hospitalized in surgery and vascular medicine. Secondly, the patients' knowledge of their treatments, the importance given by the patient to each of their treatment and the medication compliance were assessed.

Material and methods

This was an observational, prospective, single-center study conducted in a French tertiary hospital center of around 3000 beds in 9 institutions.

Patients included had to be over 18 years of age and hospitalized in the surgical and vascular medicine department, which comprises 28 beds. Drawing on literature data (5) and the experience of our medication reconciliation activity, the threshold of five medications as a reference to designate polymedicated patients was established.

Patients who were unable to participate in an interview because of cognitive impairment or language barrier were not included. All patients underwent a medication review on admission to the vascular medicine and surgery department to obtain a complete record of their usual treatment. The patient inclusion period was from early March 2022 to late June 2022. All participants provided consent.

The study was based on three hetero-questionnaires completed during the patient's hospitalization.

1/ a global questionnaire regarding the patient's sociodemographic data, their usual treatments identified by the conciliation and their medication management, the information received about his treatments, the knowledge he had of his treatments (name and indication) as well as the importance he gave to each medication (scored from 1 to 10).

2/ the BMQ (Belief Medical Questionnaire). It allows for the evaluation of different specific dimensions of patients' beliefs about their medical treatments. It consists of 18 items divided into two parts: specific beliefs (patients' representations of their medical prescriptions - 10 items) and general beliefs (beliefs in medicine in general - 8 items). A 5-point Likert scale was used for the responses. For each question, a total score was calculated by adding the item scores. Each specific belief could get a score between 5 and 25, and each general belief a score between 4 and 20. The higher the scores, the more important the beliefs are. For specific beliefs, a differential score is calculated by subtracting the specific concern from the specific need. A score greater than 0 means that the perceived need for treatment is greater than the concerns. The validated French version of this questionnaire was used (10).

3/ the validated GIRERD medication adherence questionnaire, composed of 6 items (13).

The interviews were conducted by the first author.

A descriptive analysis was performed on the variables of the whole population by calculating mean, standard deviation, minimum, maximum, median and quartiles according to whether the variables were normal or not. Categorical variables were described by the numbers and percentages of each modality. For the analysis of correlations between two categorical variables, a Chi-2 test was performed. To test the association between a qualitative variable and a quantitative variable, a Student's t test, ANOVA, Wilcoxon test, or Kruskall-Wallis test were

used, depending on the number of modalities of the qualitative variable and the normality of the quantitative variable. All analyses were performed using SAS® version 9.4 software.

This study was approved by the local ethics committee (Groupe Nantais d'Ethique dans le Domaine de la Santé) on June 22th 2022 (GNEDS 20220622).

Results

Characteristics of the patients and their treatments

Over the period, three hundred sixty five patients underwent a medication reconciliation. Of the patients eligible and available at the time of service, one hundred patients were included in the study. All patients completed the study and were analyzed. The characteristics of the patients and their treatments are presented in ***Table 1.*** Patients reported being treated for an estimated period of 19.4(± 12.4) years. On average, 9.4 (± 3.6) drugs were prescribed simultaneously, mostly for cardiovascular (32%), digestive (19.8%) or neurological (18%) diseases. The majority of patients were informed about their treatments by a doctor, but more than a quarter (27%) felt the need for more information.

Women felt that they received less information about drugs from healthcare professionals than men (48.4% vs. 71.0%, p = 0.0292).

Beliefs

The results of the BMQ questionnaire for the population are presented in ***Figure 1*** and the BMQ score values are detailed in ***Table 2.*** Overall, patients said that their medication helped them not to feel worse, that without it they would be sicker or that their life would be impossible. They were aware that their future life depended on taking them. However, almost one in three patients felt that doctors were too trusting of medication, and that they would prescribe less if they had more time. They wondered about poor tolerance and possible addiction to certain medications. The BMQ scores clearly show that the balance of benefits and risks perceived by the patients is clearly in favor of taking the treatments for 96% of them.

The more medications patients took, the more they believed in the importance of their treatment ($r= 0.27$, $p= 0.0064$). Women believed more in the harm of treatments ($p= 0.0352$) and in the overuse of drugs than men ($p= 0.0170$)

Compliance

The responses to the GIRERD questionnaire are presented in ***Table 3.*** Only 11% of patients had good compliance with their treatments according to the questionnaire score. One in 10 was considered totally non-compliant.

The more compliant patients were, the more they believed in the importance of their medication (p = 0.0039).

No significant correlation was found between the level of compliance and age (p = 0.50), level of education (p = 0.52) or number of medications (p = 0.0733).

Knowledge

On average, patients were able to name 49.3% of their treatments. Sixteen percent of patients could name all of their treatments, while 11% of patients could not name any of their treatments. On average, patients knew 73.1% of the indications for all their usual treatments. When 32 patients were able to name all the indications of their medication, 3 patients could not name any.

Several correlations were found, notably between age and patient knowledge ***(Supplemental Table),*** but also with educational level. Indeed, patients with higher education knew more about the indications of their treatments (mean= 85.1±22.8) than patients with no education (mean= 40.9±29.4) (p = 0.0017).

The least cited drug classes were anti-histamines for systemic use (28.6%), analgesics (26.8%), anti-anemic preparations (24.0%) and ophthalmic drugs (20%).

Among the most prescribed drug classes, the most cited were anti-thrombotics (64.7%), beta-blockers (55.9%), drugs acting on the renin angiotensin system (49.3%) and anti-diabetics (46.8%).

The drug classes with the highest rate of incorrect indications were cardiology drugs (60%), anti-anemic preparations (48%), diuretics (47.5%), beta-blockers (45.8%) and lipid-lowering drugs (45%).

When patients were asked about their treatments, a large proportion did not spontaneously mention the drugs they took "if needed", in particular analgesics such as paracetamol or symptomatic drugs such as antihistamines.

A comparison between beliefs, compliance and knowledge was made. The results obtained are detailed in ***Table 4***. For patients with low compliance, the more they knew the indications of their treatments, the less they feared their harmfulness. And the more they knew how to name treatments, the less they feared overuse.

Importance ratings

Fourteen patients were unable to rate the importance of their treatment because they felt that all their medications were equally important.

Out of the most prescribed drug classes, two had a median importance score of less than 6: nasal preparations (3 prescriptions, median score 5.0) and constipation medications (13 prescriptions, median score 5.5). Those with the highest importance scores were antidiabetics (62 prescriptions, median score 9.5), immunosuppressants (10 prescriptions, median score 10), and antithrombotics (116 prescriptions, median score 9).

Symptomatic medications scored high in importance. Analgesics (82 prescriptions), antihistamines (14 prescriptions), and medications for acid-related disorders (52 prescriptions) all received a median score of 8.

There was no significant correlation between median patient ratings and compliance ($r = -0.13$, $p = 0.3623$).

Discussion

Our study showed that patients perceived their treatments as beneficial rather than worrying. A correlation between compliance and beliefs was observed. "Non-compliant" patients had a more negative overall view of medication than "compliant" patients. The level of compliance and

knowledge of our patients was low. Only 11% of the patients were "good observers", 16% of the patients could perfectly name their treatment and 36% knew all the indications.

In recent years, several studies assessed treatment representations and their influence on medication adherence. However, to our knowledge, this study is the first to assess patients' beliefs about their chronic treatment in relation to their knowledge and adherence in a vascular medicine and surgery department.

Our results regarding the importance attributed by patients to their chronic medication are consistent with the data found in the literature. French studies have evaluated the representation of treatments in chronic pathologies, particularly in asthma (12), diabetes and HIV (10), and bronchopulmonary cancer (14). All these studies have highlighted the importance that patients attach to their medication. Thus, patients perceive their treatment as beneficial rather than worrisome. Indeed, in our study, 77% of patients were not worried about taking medication and 76% were not disturbed by medication in their daily lives.

Several studies have shown a correlation between patients' representations of their treatment and the level of compliance. Horne *et al.* demonstrated this link for each of the chronic pathologies studied via the BMQ questionnaire in 324 patients. These were also patients with

various chronic diseases (asthma, oncology, cardiac and renal diseases). Indeed, the "need" score was correlated with good compliance and the "concern" score was related to poor compliance in each of the diseases studied (11). Our results could not show a significant correlation but a trend towards the same result. Conducting disease specific analyses on a larger group in our setting could confirm this trend.

A French study also investigated the correlations between beliefs and compliance in patients with chronic diseases in general practices (15). Of the 265 patients included in the study, 40.8% had good compliance, 53.2% were "moderately compliant" and 6% were "non-compliant". In our study, only 11% of patients were "good compliant". This can be explained by a significant difference in the average number of medications taken by patients. In their study, patients had an average of 3.6±2.6 medications, almost three times less than in our study. One of the 6 questions of the GIRERD questionnaire related to the amount of medication to be taken: "Do you think you have too many pills to take" and 67% of our patients answered "yes". This may explain the low rate of "good compliance".

Deat *et al.* highlighted a significant relation correlation between the degree of compliance and the BMQ scores "concerns", "harmfulness" and "overuse", supporting the trend shown in our study. The absence of a statistical significancy could be explained by an important difference in the number of patients in each compliant group. Only ten patients were "non-adherent".

Regarding the concerns of "non-adherent" patients, our results are consistent with their study: patients were more concerned with their treatment, which may have an impact on compliance. Fall *et al.* conducted a study in diabetic and HIV patients (10). A disease-specific analysis showed significant correlations between adherence and the necessity and worry scales. Thus, negative beliefs were predictive of poor adherence. Non-adherent patients would therefore have a more negative overall view of medication than adherent patients.

According to the study by Huon *et al.* (16), the average number of medications taken by the elderly is 8 in the 70–80-year-olds, 9.61 in the 80–90-year-olds, 9.92 in the 90–100-year-olds and 8.11 for the over 100-year-olds. Overall, the increase in medication use varies as the population ages. Our patients, with an average age of 70.8 years, took an average of 9.7 medications. Unfortunately, the higher the number of medications, the higher the risk of forgetting or not taking the treatments (17). This high number of medications also has a role in patients' knowledge and beliefs. Our results showed that the more medications patients took, the less they knew about their names and indications. These results confirm those found in the literature (18).

One study showed that knowledge of drug indications varied according to ATC class. Indeed, the drug classes for which the indication was not known were cardiovascular drugs (12%), asthma drugs (5%) and estrogen therapies (5%) (19). In our study, we also noted that the

indications for cardiovascular drugs were the least known. Indeed, patients hospitalized in the vascular medicine department have many cardiology medications. It is therefore essential that caregivers take sufficient time with patients to educate and involve them in their care. Persall *et al.* (19) also showed that the older and less educated the patients were, the less they knew about their treatments. Our results are consistent with this study.

Only 16% of patients could perfectly name their treatment and 36% knew all the indications. In general, the level of knowledge of patients about their treatment was low. However, it is difficult to compare our results with those found in the literature, because of the disparity between the number of drugs taken per patient and the number of patients included. Indeed, Akici *et al.* (20) showed, in a study including 1618 patients with an average number of drugs of 3.3 per patient, that only 10.9% of patients could correctly name their treatment. Given the average number of medications taken by the patients in our study, more than 9, it seems normal that this number is low in our results. The study by Haidar-Ahmad *et al.* including 351 patients, with a mean number of medications taken of 3.83, described that 80.74% of the medications were known by the patients (21).

Persall *et al.,* included 616 patients in their study. Only 13.5% of patients did not know any of the indications. They also noted a significant lack of knowledge of their patients for cardiovascular medications (19).

Although patients' levels of knowledge and compliance were low, the importance they placed on their treatment was high. Patient ratings showed that the majority of prescribed drug classes were considered important to them. Only four ATC classes scored below average. This result confirms the "necessity" score obtained in the BMQ questionnaire. A French study assessed drug-related representations in patients with multiple myeloma (22). The authors estimated the importance the patient placed on his or her medications. Antithrombotic drugs, unlike our study, were rated lower, whereas anticancer drugs scored highest. This significant difference between medications that are all part of the overall management of myeloma could be explained by the degree of information provided to patients. Indeed, while the direct link between anticancer drugs and myeloma can easily be made, the link between antithrombotic drugs and the fatal consequences of myeloma is less intuitive. Our work reports on patients with multiple and varied chronic pathologies, with a large number of prescribed medications. Despite this, few differences were observed between ATC classes and therefore chronic pathologies. For a majority of patients, all treatments were equivalent in importance. Indeed, even if the patients did not spontaneously cite their symptomatic treatments, they gave them a high importance. This is due to the perceived immediate effect of using these treatments. This result is consistent with another study (23) that showed that patients were more familiar with analgesics than with

cardiovascular drugs, because they felt their effects directly. Lastly, in our study, patients were very familiar with the effects of their symptomatic medications but did not cite them directly.

If representations about treatments influence patient adherence, adherence is also determined by the relationship of trust with the physician. Several studies have shown that the relationship between the physician and the patient has a significant impact on the feeling of usefulness and efficacy of the treatment, but also on adherence (24). Studies have shown that when patients had sufficient information and understood the purpose of their treatment, they had better compliance (25). In our study, the majority of patients reported receiving information about their treatment, but one third felt that this was not sufficient.

Assessing patients' beliefs would allow us to better target their priorities, and thus to develop adapted educational actions and tools. Indeed, understanding the mechanisms and potential evolution of the disease will make it easier for patients to assimilate the objectives of their treatments and will facilitate their therapeutic adherence (26).

Strengths and biases

To our knowledge, the representation and beliefs of chronic treatments have not been studied in a vascular medicine and surgery department, in patients with multiple medications and

cardiac pathologies. This is a single-center study. It would be interesting to conduct this work in other centers in order to obtain generalizable and transferable results.

In our study, the BMQ was used for a combination of several diseases, whereas its French version has only been validated for diabetes and HIV (10). Thus, patients with several chronic diseases may not have the same representations regarding the treatments for each disease. The scores given by patients on each of their treatments were used to estimate the level of importance given to each medication. Finally, for the majority of patients, all their medications were equally important, which may indicate a lack of prioritization.

Another limitation of our study is the use of a questionnaire alone to assess adherence, when several methods of measuring adherence exist (direct and indirect methods). Although the questionnaire is a simple, quick and inexpensive technique, it is less robust when used alone. Many authors recommend using at least two methods. In addition, the use of questionnaires tends to overestimate compliance (27) which may seem worrying in view of the already low adherence reported in our results. In the context of short-stay inpatients, it was not possible to use direct methods (drug measurements, biological marker measurements), or to use any other indirect method than the questionnaire. Moreover, this would have lengthened the interview time with the patients and thus made the procedure more cumbersome.

Concerning the evaluation of knowledge, the hospitalization of our population certainly had an impact on the real knowledge of the patients about their treatment. Being in a stressful environment, in a context of acute pathology, could potentially have decreased their true knowledge of the names and indications of their treatment, inducing a bias.

One of the exclusion criteria for the study was cognitive impairment. This was assessed clinically but was not confirmed by a specific assessment test such as Mini Mental State Examination (MMSE). This would have again made the protocol and interviews more cumbersome.

Conclusion

The level of knowledge and compliance of patients with multiple chronic diseases in surgery and vascular medicine is low. Representations of the disease and of medication have an impact on patients' behaviour. They are determinants of adherence to medication. Identifying patients' beliefs about their chronic treatment allows caregivers to adapt information to patients' needs. Better information from healthcare professionals (physician, nurse, pharmacist, etc.) regarding the indication and efficacy of the prescribed treatment is essential. Combined with the consideration of patients' concerns, particularly regarding tolerance, this will improve the

benefit/concern ratio perceived by these patients, and thus increase their compliance. The BMQ may help to identify patients at risk of poor compliance.

Bibliography

1. Michel Chassang, Anne Gautier. www.lecese.fr [En ligne]. Les maladies chroniques [cité le 21 janvier 2022]. Disponible: https://www.lecese.fr/sites/default/files/pdf/Avis/2019/2019_14_maladies_chroniques.pdf

2. WHO Chronic disease report [En ligne]. [cité le 21 janvier 2022]. Disponible: https://www.who.int/chp/chronic_disease_report/media/information/factsheets_FR_web.pdf

3. S.Briançon, G.Guérin, B.Sandrin-Berthon. [En ligne]. [cité le 21 janvier 2022]. Disponible: 2010-09-adsp-n°72-maladies-chroniques-et-ETP.pdf.

4. J.P. Laroche, B. Guilbert, G.Miserey, P. Goffette, Conseil National Professionnel de Médecine Vasculaire, Médecine Vasculaire - Etat des lieux 2015. [En ligne]. [cité le 26 juillet

2022]. Disponible:

https://www.portailvasculaire.fr/sites/default/files/docs/livre_blanc_2015.pdf

5. M. Monégat, C. Sermet, M. Perronnin, E. Rococo, la polymedication definitions mesures et enjeux. [En ligne]. [cité le 3 janvier 2022]. Disponible: https://www.irdes.fr/recherche/questions-d-economie-de-la-sante/204-la-polymedication-definitions-mesures-et-enjeux.pdf

6. Le Cossec C. La polymédication au regard de différents indicateurs de sa mesure: impact sur la prévalence, les classes thérapeutiques concernées et les facteurs associés. Paris: IRDES; 2015. (Les rapports de l'IRDES).

7. M. P. Schneider, L. Herzig, D. Hugentobler Hampai, O. Bugnon. Revue Medicale Suisse. Adhésion thérapeutique du patient chronique : des concepts à la prise en charge ambulatoire [En ligne]. [cité le 3 janvier 2022]. Disponible: https://www.revmed.ch/revue-medicale-suisse/2013/revue-medicale-suisse-386/adhesion-therapeutique-du-patient-chronique-des-concepts-a-la-prise-en-charge-ambulatoire

8. Turrise S. Illness Representations, Treatment Beliefs, Medication Adherence, and 30-Day Hospital Readmission in Adults With Chronic Heart Failure: A Prospective Correlational Study. J Cardiovasc Nurs. 2016;31(3):245-54. DOI: 10.1097/JCN.0000000000000249

9. Horne R, Weinman J, Hankins M. The beliefs about medicines questionnaire: The development and evaluation of a new method for assessing the cognitive representation of medication. Psychol Health. 1999;14(1):1-24. DOI: 10.1080/08870449908407311

10. Masson E. EM-Consulte. Validation of the French version of the Beliefs about Medicines Questionnaire (BMQ) among diabetes and HIV patients [En ligne]. [cité le 3 janvier 2022]. Disponible: https://www.em-consulte.com/article/934270/validation-of-the-french-version-of-the-beliefs-ab

11. Horne R, Weinman J. Patients' beliefs about prescribed medicines and their role in adherence to treatment in chronic physical illness. J Psychosom Res. 1999;47(6):555-67. DOI: 10.1016/S0022-3999(99)00057-4

12. Charles C, Ninot G, Sultan S. Représentations des patients et observance des traitements par corticostéroïdes inhalés dans l'asthme. Revue systématique sur la période 1999–2009. Rev Mal Respir. 2011;28(5):626-35. DOI: 10.1016/j.rmr.2010.11.003

13. Girerd X, Hanon O, Anagnostopoulos K, Ciupek C, Mourad JJ, Consoli S. [Assessment of antihypertensive compliance using a self-administered questionnaire: development and use in a hypertension clinic]. Presse Medicale Paris Fr 1983. 2001;30(21):1044-8.

14. Torrecillas S, Perrot E, Gérinière L, Locatelli-Sanchez M, Laffay L, Souquet P-J, et al. Croyances des patients envers les thérapies ciblées orales et leur influence sur l'observance dans le cancer broncho-pulmonaire : une étude pilote prospective. Rev Pneumol Clin. 2016;72(1):25-34. DOI: 10.1016/j.pneumo.2015.03.005

15. Déat et al. Croyances à propos des médicaments et observance chez les patients atteints de maladie chronique. Exerc Rev Francoph Médecine Générale. 28(138):436.

16. Huon J-F, Lenain E, LeGuen J, Chatellier G, Sabatier B, Saint-Jean O. How Drug Use by French Elderly Patients Has Changed During the Last Decade. Drugs - Real World Outcomes. 2015;2(4):327-33. DOI: 10.1007/s40801-015-0041-6

17. Bruyer B. Évaluation des connaissances que les patients ont de leurs traitements et du temps d'éducation thérapeutique en consultation de médecine générale ou en pharmacie. 2020;62.

18. Chung MK, Bartfield JM. Knowledge of prescription medications among elderly emergency department patients. Ann Emerg Med. 2002;39(6):605-8. DOI: 10.1067/mem.2002.122853

19. Persell SD, Heiman HL, Weingart SN, Burdick E, Borus JS, Murff HJ, et al. Understanding of drug indications by ambulatory care patients. Am J Health Syst Pharm. 2004;61(23):2523-7. DOI: 10.1093/ajhp/61.23.2523

20. Akici A, Kalaça S, Uğurlu MU, Toklu HZ, Iskender E, Oktay S. Patient knowledge about drugs prescribed at primary healthcare facilities. Pharmacoepidemiol Drug Saf. 2004;13(12):871-6. DOI: 10.1002/pds.1020

21. Haidar-Ahmad F. Les facteurs influençant la connaissance du traitement chronique : étude menée sur 351 patients dans les 14ème, 15ème et 16ème arrondissements de Marseille. 2019;51. DOI: 10/document

22. Huon J-F, Fronteau C, Caffin A-G, Ranchon F, Quinio F, Maucourant L, et al. Évaluation des représentations relatives aux médicaments chez les patients atteints de myélome multiple. Educ Thérapeutique Patient - Ther Patient Educ. EDP Sciences; 2017;9(1):10101. DOI: 10.1051/tpe/2017002

23. Oudjhani M, Foison O, Astier A. Est-ce que les sujets âgés connaissent leurs traitements ? J Pharm Clin. 2012;31(2):113-6. DOI: 10.1684/jpc.2012.0215

24. Fuertes JN, Mislowack A, Bennett J, Paul L, Gilbert TC, Fontan G, et al. The physician–patient working alliance. Patient Educ Couns. 2007;66(1):29-36. DOI: 10.1016/j.pec.2006.09.013

25. Monnier G, Charpiat B, Serratrice F, Bossaert S, Fourcade N, Ducerf C. Evaluation de l'apport d'une consultation de pharmacie sur les connaissances des patients transplantés hépatiques. Therapies. 2003;58(4):305-11. DOI: 10.2515/therapie:2003047

458 26. Kelly M, McCarthy S, Sahm LJ. Knowledge, attitudes and beliefs of patients and

459 carers regarding medication adherence: a review of qualitative literature. Eur J Clin

460 Pharmacol. 2014;70(12):1423-31. DOI: 10.1007/s00228-014-1761-3

461 27. Allenet B, Baudrant M, Lehmann A, Gauchet A, Roustit M, Bedouch P, et al.

462 Comment évaluer l'adhésion médicamenteuse ? Le point sur les méthodes. Ann Pharm Fr.

463 2013;71(2):135-41. DOI: 10.1016/j.pharma.2012.10.001

464

Acknowledgments

The authors would like to thank all the staff members of the medicine and vascular surgery for their kind help in performing this study.

Funding

No funding was obtained for this study.

Data Availability Statement

The data underlying this article will be shared on reasonable request to the corresponding author.

Conflict of Interest

The Author(s) declare(s) that there is no conflict of interest.

Legends

Figure 1: Responses to the BMQ questionnaire (percentage of responses among the 100 patients)

Tables

***Table 1**. Characteristics of the population (N=100) and the drugs (N=965)*

Characteristics of patients	**N=100**
Female sex	31 (31.0%)
Age (years)	70.8 ± 10.7 [38.0;92.0]
Time since first chronic treatment (years)	19.4 ± 12.4 [0.5;58.0]
Level of study	
Secondary level	45 (45.0%)
Higher study	24 (24.0%)
Primary level	24 (24.0%)
Lack of study	7 (7.0%)
Socio-professional category	
Workers	31 (31.0%)
Intermediate professions	18 (18.0%)
Employees	17 (17.0%)
Executives, Higher intellectual professions	14 (14.0%)
Craftsmen, Shopkeeper, Compagny managers	12 (12.0%)
Farmer	5 (5.0%)
Other†	3 (3.0%)
Lifestyle	
Circled	91 (91.0%)
Alone	9 (9.0%)
Organization around medication intake	
Autonomous	83 (83.0%)
Help from relatives (partner, children)	11 (11.0%)
Assistance from a nurse	6 (6.0%)
Information received at the start of treatment	87 (87.0%)
Source of information	
From the general practitioner	73 (73.0%)
From the specialist doctor	61 (61.0%)
From the pharmacist	46 (46.0%)
From family and frends	5 (5.0%)
Information received perceived as sufficient by the patient	64 (64.0%)
Need for additional research (Internet, books, magazines, leaflets)	27 (27.0%)
Drug Characteristics	**N=965**

Number of drugs per patient	9.7 ± 3.6 [5;21]
ATC class od of drugs	
Cardiovascular (C)	310 (32.0%)
Digestive tract and metabolism (A)	190 (19.8%)
Nervous System (N)	175 (18.0%)
Blood and blood-forming organs (B)	141 (14.6%)
Respiratory system(R)	47 (4.9%)
Systemic hormones, excluding sex hormones (H)	19 (2.0%)
Other‡	83 (8.7%)

Results are presented as mean ± standard deviation [minimum-maximum] for quantitative variables and as counts (%) for qualitative variables

*To the question "Since when have you been taking your first chronic treatment?", 4 patients were unable to answer.

†Other occupations: Farmer (5%), Housewife (2%), No occupation (1%)

‡Other ATC class: H-Systemic hormones, excluding sex hormones (2.0%), J-General anti-infectives for systemic use (0.8%), L-Antineoplastics and immunomodulators (1. 6%), P-Antiparasitic, insecticides (0.1%), V-Miscellaneous (0.6%), D-Dermatological drugs (0.5%), M-Muscle and skeletal (1.4%), S-Sensory organs (1%), G-Genitourinary system and sex hormones (1.7%), No ATC class (1%)

Table 2. *BMQ score results - Beliefs*

BMQ* - Beliefs	**N = 100**	**Male N = 69**	**Female N = 31**	**p-value**
Specific Beliefs - Necessity	21.9±3.5 [8.0;25.0]	21.7±3.6	22.2±3.1	0,4822
Specific Beliefs - Concerns	11.1±4.8 [5.0;23.0]	10.5±4.4	12.5±5.5	0.0509
General Beliefs - Harm	9.1±3.2 [4.0;17.0]	8.6±3.0	10.1±3.5	**0.0352**
General Beliefs - Overuse	10.3±3.4 [4.0;17.0]	9.8±3.4	11.5±3.3	**0.0170**
BMQ Necessity - BMQ Concern > 0†	96 (96.0%)	66 (95.7%)	30 (96.0%)	1.0000

Results are presented as mean ± standard deviation [minimum-maximum] or numbers and percentages

Specific belief scores range from 5 to 25 and general belief scores range from 4 to 20. A high score indicates a strong belief.

*BMQ: Belief Medical Questionnaire

†BMQ "necessity" - BMQ "concern" > 0 means that the beneficial character is superior to the worrying character.

Table 3. *Responses to the GIRERD questionnaire and correlations between compliance and beliefs (N=100)*

Questions and number of positive responses				**N (%)**
Did you forget to take your medication this morning?				1 (1.0%)
Since your last visit, have you run out of medication?				7 (7.0%)
Have you ever taken your medication late compared to the usual time?				43 (43.0%)
Have you ever not taken your medication because your memory fails you some days?				23 (23.0%)
Have you ever not taken your medication because some days you feel that your medication is doing you more harm than good?				9 (9.0%)
Do you think you have too many pills to take?				61 (61.0%)
	Good compliance N = 11 (11.0%)	**Low compliance** N = 79 (79.0%)	**Non-compliance** N = 10 (10.0%)	p-value
Specific Beliefs - Necessity	21.0 [6.0;12]	23.0 [21.0;25.0]	23.0 [16.0;24.0]	0.6487
Specific Beliefs - Concerns	9.0 [6.0;12.0]	11.0 [6.0;14.0]	17.0 [9.0;20.0]	0.1163
BMQ Necessity - BMQ Concern > 0†	11 (100.0%)	78 (98.7%)	7 (70.0%)	**0.0039**
General Beliefs - Harm	9.0 [6.0;12.0]	8.0 [6.0 ;11.0]	11.5[9.0 ;16.0]	0.0739
General Beliefs - Overconsumption	8.0 [5.0 ;12.0]	10.0 [8.0 ;13.0]	13.0 [9.0 ;16.0]	0.1086

The results are presented in median [1st Quartile; 3rd Quartile] for quantitative variables and in the form of numbers (%) for qualitative variables

Specific belief scores range from 5 to 25 and general belief scores range from 4 to 20. A high score indicates a strong belief.

*GIRERD score: six negative ("no") responses: patient is "good compliance". Four or five "no" responses: patient is "poorly compliant". Two or three "no" responses: the patient is "non-observant".

†BMQ "necessity" - BMQ "concern" > 0 means that the beneficial character is superior to the worrying character.

BMQ: Belief Medical Questionnaire

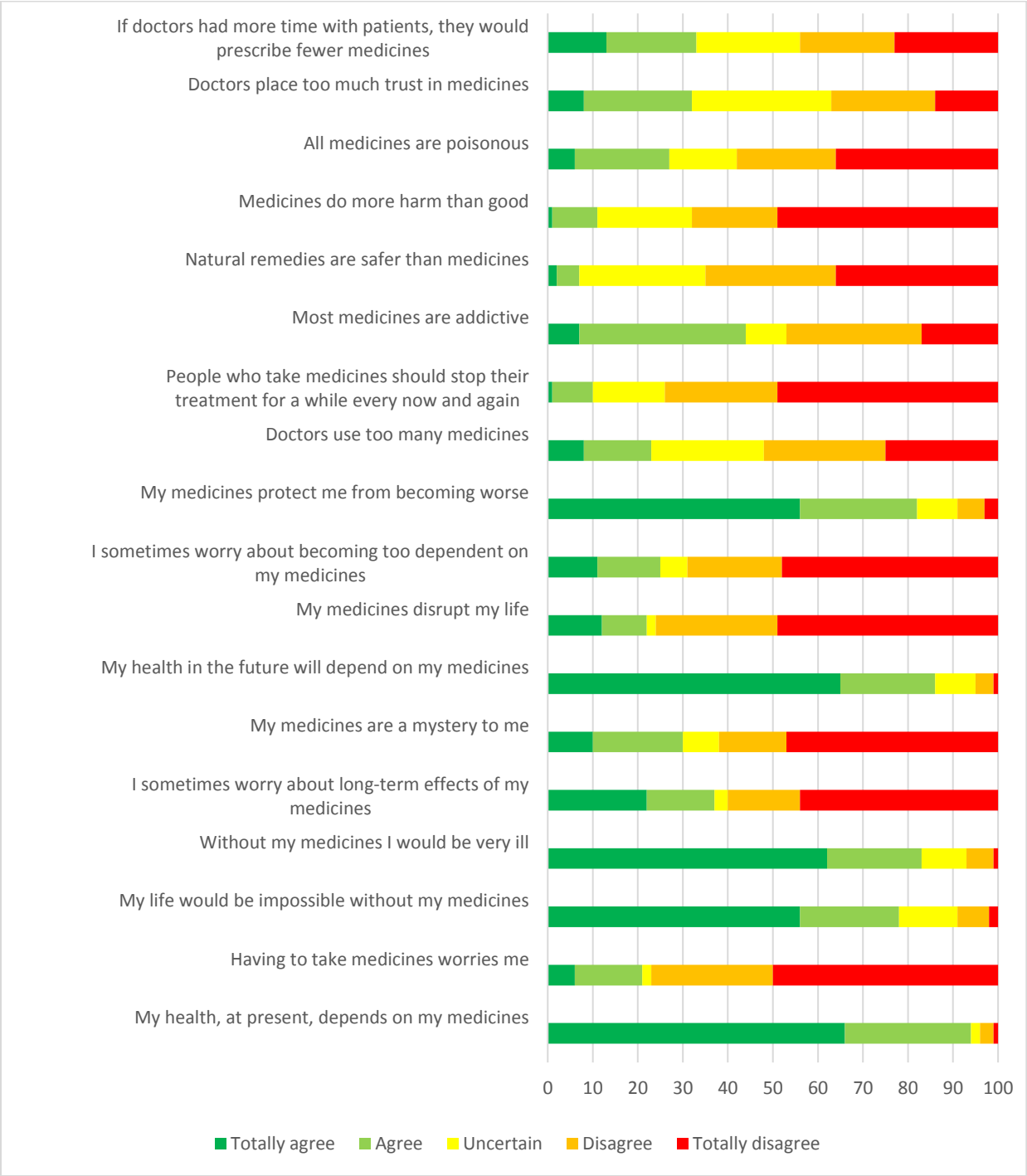
Table 4*. Correlation between adherence, beliefs and knowledge about their treatments for the 100 patients*

Example: In patients with low adherence, the more they know about the indications for their treatments, the less fear they have that the medications will be harmful.

	Beliefs	**Drugs mentionned**		**Known indications**	
		r	p	r	p
Good compliance (N=11)	Specific Beliefs - Necessity	-0.22	0.5220	0.17	0.6185
	Specific Beliefs - Concerns	-0.01	0.9837	-0.11	0.7403
	General Beliefs - Harm	0.07	0.8488	0.15	0.6686
	General Beliefs - Overuse	0.37	0.2651	0.26	0.442
Low compliance (N=79)	Specific Beliefs - Necessity	0.01	0.9540	-0.07	0.5457
	Specific Beliefs - Concerns	-0.12	0.2994	-0.11	0.3491
	General Beliefs - Harm	-0.21	0.0689	-0.30	**0.0069**
	General Beliefs - Overuse	-0.23	**0.0401**	-0.21	0.0630
Non-compliance (N=10)	Specific Beliefs - Necessity	-0.35	0.3216	-0.43	0.2149
	Specific Beliefs - Concerns	0.41	0.2434	0.44	0.2064
	General Beliefs - Harm	0.21	0.5643	0.57	0.0858
	General Beliefs - Overuse	0.38	0.2726	0.47	0.1677

Contributors : DK, JS, MB, SPL and JFH contributed to the study conception and design. Data collection and analysis were performed by DK. The first draft of the manuscript was written by DK and JS, MB, AB, SPL and JFH commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Figure 1: *Responses to the BMQ questionnaire (percentage of responses among the 100 patients)*



Reporting checklist for cross sectional study.

Evaluation of beliefs and representations of chronic treatments of patients hospitalized in medicine and vascular surgery

D. Kotry *et al.*

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the STROBE cross sectionalreporting guidelines, and cite them as:

von Elm E, Altman DG, Egger M, Pocock SJ, Gotzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies.

Reporting Item	Page Number
Title and abstract	

Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	2-3
Introduction			
Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	#3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	#4	Present key elements of study design early in the paper	5
Setting	#5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of selection of participants.	5
	#7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than	5-6

		one group. Give information separately for for exposed and unexposed groups if applicable.	
Bias	#9	Describe any efforts to address potential sources of bias	NA
Study size	#10	Explain how the study size was arrived at	5
Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	6
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	6
Statistical methods	#12b	Describe any methods used to examine subgroups and interactions	NA
Statistical methods	#12c	Explain how missing data were addressed	NA
Statistical methods	#12d	If applicable, describe analytical methods taking account of sampling strategy	NA
Statistical methods	#12e	Describe any sensitivity analyses	NA
Results			
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-	7

		up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	
Participants	#13b	Give reasons for non-participation at each stage	NA
Participants	#13c	Consider use of a flow diagram	NA
Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	7
Descriptive data	#14b	Indicate number of participants with missing data for each variable of interest	Table 1
Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	7-9 + tables
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7-9 + tables
Main results	#16b	Report category boundaries when continuous variables were categorized	NA
Main results	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	NA

Discussion			
Key results	#18	Summarise key results with reference to study objectives	10
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	14
Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	10-15
Generalisability	#21	Discuss the generalisability (external validity) of the study results	14
Other Information			
Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	20

Supplemental Table :

Supplemental Table. *Correlation between different age categories and patients' knowledge (drugs and indications cited) (N = 100)*

	Age (years)	[30-59] N=10	[60-69] N=28	[70-79] N=46	[80 and more] N=16	p-value
Percentage of drugs cited	Median	83.3	46.4	40.0	28.6	**0.0193**
	[Q1;Q3]	[66.7;100.0]	[29.7;74.3]	[18.2;71.4]	[0.0;66.4]	
	[Min-Max]	[20.0 ;100.0]	[0.0;100.0]	[0.0;100.0]	[0.0;100.0]	
Percentage of known indications	Median	100.0	75	80.9	84.5	0.0761
	[Q1;Q3]	[82.4;100.0]	[55.2;90.5]	[54.5;100.0]	[39.4;100.0]	
	[Min-Max]	[60.0;100.0]	[23.1;100.0]	[0.0;100.0]	[0.0;100.0]	

Q1 : First Quartile ; Q3 : Third quartile ; Min : minimum ; Max : maximum

Supplemental Files 1 : Global questionnaire

Patient n°: ……..
Length of the interview: ……

Socio-demographic information :

Gender: Age: Lifestyle: ☐ Married ☐ Single ☐ Children

Origins:

Level of study:

Socio-professional category: ☐ Farmer ☐ Craftsmen, Shopkeeper, Compagny managers

☐ Executives, Higher intellectual professions ☐ Professions intermédiaires

☐ Employees ☐ Workers Other:……

Chronic treatment :

Number of medications on the prescription:

How long have you been taking your first chronic treatment?

Informations :

- Have you ever had your treatments explained to you? Yes ☐ No ☐
- Do you feel you have received enough information about your treatments? Yes ☐ No ☐
- From whom did you get information about your treatments?
    - Specialist
    - General practitioner
    - Pharmacist
    - Family

Treatment management :

- Who manages your treatments?
    - Myself
    - A nurse
    - A family member

Knowledge of my chronic treatment:

- *If the patient forgets treatments, the caregiver will quote the medication.*
- *A score between 0 and 10 should be given by the patient to estimate the importance he/she gives to his/her treatment. (0: not at all important, 10: Essential)*

My medications	Cited	Indication	Importance

Do you have any difficulties with your treatments?

……

……

……

Number of known medications :

Supplemental Files 2 : Belief Medical Questionnaire

Patient n°:

Score:

1: Totally disagree, 2: Disagree, 3: Uncertain, 4: Agree, 5: Totally agree

Specific Beliefs :

1. My health, at present, depends on my medicines:
2. Having to take medicines worries me:
3. My life would be impossible without my medicines:
4. Without my medicines I would be very ill:
5. I sometimes worry about long-term effects of my medicines:
6. My medicines are a mystery to me:
7. My health in the future will depend on my medicines:
8. My medicines disrupt my life:
9. I sometimes worry about becoming too dependent on my medicines:
10. My medicines protect me from becoming worse:

General Beliefs :

11. Doctors use too many medicines:
12. People who take medicines should stop their treatment for a while every now and again:
13. Most medicines are addictive:
14. Natural remedies are safer than medicines:
15. Medicines do more harm than good:
16. All medicines are poisonous:
17. Doctors place too much trust in medicines:
18. If doctors had more time with patients, they would prescribe fewer medicines:

Supplemental Files 3 : GIRERD questionnaire

Assessment of medication compliance

Patient n° :

	YES	NO
Did you forget to take your medication this morning?		
Since your last visit, have you run out of medication?		
Have you ever been late taking your medication?		
Have you ever not taken your medication because your memory fails you some days?		
Have you ever not taken your medication, because some days you feel that your treatment is doing you more harm than good?		
Do you think you have too many pills to take?		

Supplemental Files 4 : The local ethics committee

AVIS 22-06-2201
Groupe Nantais d'Ethique dans le Domaine de la Santé (GNEDS)

Nom du protocole Code et versioning	**Croyances et représentations chez les patients polymédiqués en chirurgie et médecine vasculaire**

Investigateur principal	Dr JF HUON
Lieu de l'étude	CHU NANTES
Type de l'étude	Monocentrique, prospective, exploratoire, observationnelle
Type patients/participants	Patients polymédiqués hospitalisés en chirurgie et médecine vasculaire
Nombre de patients/participants prévus	100
Objectif principal	Evaluation de la croyance des patients sur leurs traitements habituels
Objectif secondaire	Connaissance et importance données par le patient à chacun de ses traitements Adhésion médicamenteuse

Documents communiqués

Justification de l'étude	OUI
Méthodologie	OUI
Lettre d'information et lettre de consentement	OUI

Remarque générale
Le GNEDS formule d'abord la remarque qu'il n'a pas pour mission de donner un avis sur les aspects scientifiques du protocole, en particulier sur l'adéquation de la méthodologie aux objectifs poursuivis par l'étude. Il ne tient compte des données d'ordre scientifique et méthodologique que dans la mesure où elles ont des implications d'ordre éthique. Dans le cas présent, il se bornera à constater que les objectifs de cette étude et sa méthodologie sont conformes aux principes de l'éthique.

Confidentialité

Confidentialité	OUI
Anonymat	OUI
CNIL	RGPD

Commentaires :

Information et consentement

Consentement :

Recueil nécessaire	OUI
Type consentement préférable	ORAL
Traçabilité dans le dossier	NA

Commentaires :

Lettre information précisant :

Titre de l'étude	OUI
But de l'étude	OUI
Déroulement de l'étude	OUI
Prise en charge courante inchangée	OUI
Possibilité de recevoir résultats de l'étude	OUI
Traçabilité dans le dossier	NA

Commentaires :

Conclusion

Avis favorable	OUI
Révision nécessaire selon commentaires	
Avis défavorable	

GNEDS : Professeur Paul BARRIERE

Nantes le 22 juin 2022

BMJ Open

An observational and prospective study: Evaluation of beliefs and representations of chronic treatments of polymedicated patients hospitalized in medicine and vascular surgery

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2023-073250.R1
Article Type:	Original research
Date Submitted by the Author:	30-Aug-2023
Complete List of Authors:	Kotry, Dounia; University Hospital Centre Nantes, Saillard, Justine; CHU Nantes, Pharmacy Bonsergent, Marion; CHU Nantes, Pharmacy Volteau, Christelle; Centre Hospitalier Universitaire de Nantes Benichou, Antoine; CHU Nantes, Internal Medicine Prot-Labarthe, Sonia; Nantes Université, Pharmacie; ECEVE HUON, Jean-François; University Hospital Centre Nantes, Clinical Pharmacy; University of Nantes, Faculty of Pharmacy, Clinical Pharmacy department
Primary Subject Heading:	Cardiovascular medicine
Secondary Subject Heading:	Patient-centred medicine
Keywords:	Patient-Centered Care, CLINICAL PHARMACOLOGY, Patient Reported Outcome Measures

I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our licence.

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which Creative Commons licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

An observational and prospective study: Evaluation of beliefs and representations of chronic treatments of polymedicated patients hospitalized in medicine and vascular surgery

Dounia KOTRY[1], Justine SAILLARD[1], Marion BONSERGENT[1], Christelle VOLTEAU[2], Antoine BENICHOU[3], Sonia PROT-LABARTHE[4], Jean-François HUON[5]

University degree:

Dounia KOTRY, PharmD

Justine SAILLARD, PharmD

Marion BONSERGENT, PharmD

Christelle VOLTEAU

Antoine BENICHOU, MD

Sonia PROT-LABARTHE, PharmD, PhD

Jean-François HUON, PharmD, PhD

Affiliations:

1. Nantes Université, CHU Nantes, Pharmacie, F-44000, France

2. Plateforme de Méthodologie et Biostatistique, DRi du CHU de Nantes, Nantes, France

3. Nantes Université, CHU Nantes, Médecine interne, F-44000, France

4. Nantes Université, CHU Nantes, Pharmacie, F-44000, France, Université Paris Cité, INSERM, ECEVE, F-75010 Paris, France

5. Nantes Université, Univ Tours, CHU Nantes, CHU Tours, Pharmacie, INSERM, MethodS in Patients-centered outcomes and HEalth Research, SPHERE, F-44000 Nantes, France

Corresponding author:

Dounia KOTRY, dounia.kotry@gmail.com

Mails:

Justine SAILLARD: justine.saillard@chu-nantes.fr

Marion BONSERGENT: marion.bonsergent@chu-nantes.fr

Christelle VOLTEAU: christelle.volteau@chu-nantes.fr

Antoine BENICHOU: antoine.benichou@chu-nantes.fr

Sonia PROT-LABARTHE: sonia.protlabarthe@chu-nantes.fr

Jean-François HUON: jeanfrancois.huon@chu-nantes.fr

Abstract

Objectives: Today, the involvement of patients in their care is essential. As the population ages increases, the number of patients with chronic diseases is increasing. In the medical and vascular surgery departments, patients are polymedicated and mostly suffer from several chronic diseases. Approximately 50% of patients with a chronic disease are not adherent. Among the factors that can influence therapeutic adherence are the beliefs and representations of patients. To evaluate the beliefs and representations of chronic treatments in patients with multiple medications and hospitalized in a vascular medicine and surgery department, and to

evaluate the medication adherence, the knowledge, and the importance patients attach to their treatments.

Design: Observational, prospective and a single-center study.

Setting: The study was conducted in a French tertiary hospital center of around 3000 beds in 9 institutions.

Participants: Adult polymedicated (i.e minimum of 5 chronic treatments) patients hospitalized in the surgical and vascular medicine department were included after application of the exclusion criteria.

Methods: Patient interviews were carried out in the department and were based on three interviewer administered questionnaires (a global questionnaire, the Belief Medical Questionnaire (BMQ) and the GIRERD questionnaire).

Results: Our study showed that patients perceived their treatments as beneficial rather than worrying. A correlation between medication adherence and beliefs was observed. "Non-adherent" patients had a more negative overall view of medication than "adherent" patients. The level of compliance and knowledge of our patients was low. Only 11% of the patients were "good adherent", 16% of the patients could perfectly name their treatment and 36% knew all the indications.

Conclusion: Knowledge of treatment representation and beliefs are central to understanding patient behaviour. Considering patients' representations will allow the identification of levers, and the development of actions and educational tools adapted to improve their adherence, their knowledge and therefore their drug management.

Data availability statement: Data are available upon reasonable request

Strengths and limitations of this study

- This study aimed to explore the representation and beliefs of chronic treatments in patients with multiple medications in a vascular medicine and surgery department.
- Study assessing the links between representations, beliefs, adherence medication and patients' knowledge of their chronic treatments.
- However, it is important to note that this is a single-center study, which may limit the generalizability of the findings to other settings.

Introduction

According to the World Health Organization (WHO) (1), a chronic disease is a long-term condition that usually progresses slowly and requires long-term treatment and care. It is also characterized by its impact on the quality of life of patients. Twenty million French people are affected by a chronic disease (1). They represent 77% of all diseases, the most important of which are cardiovascular, cerebral, respiratory, metabolic and malignancies (2). Today, the prevalence of chronic diseases is rising sharply and can be explained by the aging of the population and the increase in life expectancy. They are therefore among the most common health care problems, with a major impact on public health and the economy (3).

In vascular medicine and surgery, the majority of patients have one or more chronic diseases and are polymedicated (4). Polymedication is defined as "the administration of many drugs simultaneously or the administration of an excessive number of drugs" (5,6). Furthermore, all chronic diseases require long-term management with an investment by both healthcare professionals and the patient. For this, a good level of information on the disease and treatments is necessary for the patient to avoid the risks of poor compliance. According to the WHO (7), 50% of patients do not adhere to their chronic treatment, even though this adherence is essential for the control of the chronic disease. Indeed, loss of adherence to treatment leads to a decrease

in therapeutic efficacy and exposes the patient to complications of their disease and to therapeutic failure (7).

The representations of treatments are factors that influence therapeutic adherence (8). This refers to each individual's knowledge, explanations and ideas about his disease. Representations are linked to the patient's behaviour, cultural, social and family background, education, professional activity, etc. (9). They have multiple origins and varies from one individual to another. Today, the representation of the disease, but also of treatments, is central to understanding the behaviour of patients in their health care journey. Representations and beliefs have been studied in certain chronic diseases, notably HIV, diabetes, hypertension, asthma, etc. (9-12).

However, to our knowledge, they have not been studied in the medical and vascular surgery fields, when it comes to hospitalized patients with multiple medications.

The main objective of this study was to evaluate the beliefs and representations of chronic treatments in multi-medicated patients hospitalized in surgery and vascular medicine. Secondly, the patients' knowledge of their treatments, the importance given by the patient to each of their treatment and the medication adherence were assessed.

Material and methods

This was an observational, prospective, single-center study conducted in a French tertiary hospital center of around 3000 beds in 9 institutions.

Patients included had to be over 18 years of age and hospitalized in the surgical and vascular medicine department, which comprises 28 beds. Patients had to be polymedicated prior the hospitalization. Drawing on literature data (5) and the experience of our medication reconciliation activity, the threshold of five medications as a reference to designate polymedicated patients was established.

Patients who were unable to participate in an interview because of cognitive impairment or language barrier were not included. All patients underwent a medication review on admission to the vascular medicine and surgery department to obtain a complete record of their usual treatment. The patient inclusion period was from early March 2022 to late June 2022. All participants provided oral consent.

The study was based on three questionnaires completed during the patient's hospitalization. All questionnaires were interviewer administered and concerned the treatments patients were taking prior to hospitalization.

1/ a global questionnaire regarding the patient's sociodemographic data, their usual treatments identified by the reconciliation and their medication management, the information received

about his treatments, the knowledge he had of his treatments (name and indication) as well as the importance he gave to each medication (scored from 1 to 10).

2/ the BMQ (Belief Medical Questionnaire). It allows for the evaluation of different specific dimensions of patients' beliefs about their medical treatments. It consists of 18 items divided into two parts: specific beliefs (patients' representations of their medical prescriptions - 10 items) and general beliefs (beliefs in medicine in general - 8 items). A 5-point Likert scale was used for the responses. For each question, a total score was calculated by adding the item scores. Each specific belief could get a score between 5 and 25, and each general belief a score between 4 and 20. The higher the scores, the more important the beliefs are. For specific beliefs, a differential score is calculated by subtracting the specific concern from the specific need. A score greater than 0 means that the perceived need for treatment is greater than the concerns. The validated French version of this questionnaire was used (10).

3/ the validated GIRERD medication adherence questionnaire, composed of 6 items (13). GIRERD score: six negative ("no") responses: patient is "good adherent". Four or five "no" responses: patient is "low-adherent ". Two or three "no" responses: the patient is "non-adherent".

The interviews were conducted by the first author.

Characteristics of the patients and the drugs were presented with mean, standard deviation, minimum and maximum for the quantitative variable and with frequency and percentage of each category. Spearman's correlation coefficient were used to measure association between two continuous variables. Comparison of groups were performed using Chi-squared tests for categorical variables and using ANOVA, or Kruskall-Wallis tests for continuous variables, depending of the normality of not of the distribution. The statistical significance was established with a threshold to 5%. All analyses were performed using SAS® version 9.4 software.

This study was approved by the local ethics committee (Groupe Nantais d'Ethique dans le Domaine de la Santé) on June 22th 2022 (GNEDS 20220622).

Patient and Public Involvement: No patient involved

Results

Characteristics of the patients and their treatments

Over the period, three hundred sixty five patients underwent a medication reconciliation. Of the patients eligible and available at the time of service, one hundred patients were included in the study. All patients completed the study and were analyzed. The characteristics of the patients and their treatments are presented in ***Supplemental Table 1.*** Patients reported being treated for an estimated period of 19.4(± 12.4) years. On average, 9.4 (± 3.6) drugs were prescribed simultaneously, mostly for cardiovascular (32%), digestive (19.8%) or neurological (18%)

diseases. The majority of patients were informed about their treatments by a doctor, but more than a quarter (27%) felt the need for more information.

Women felt that they received less information about drugs from healthcare professionals than men (48.4% vs. 71.0%, p = 0.0292).

Beliefs

The results of the BMQ questionnaire for the population are presented in ***Figure 1*** and the BMQ score values are detailed in ***Table 1.*** Overall, patients said that their medication helped them not to feel worse, that without it they would be sicker or that their life would be impossible. They were aware that their future life depended on taking them. However, almost one in three patients felt that doctors were too trusting of medication, and that they would prescribe less if they had more time. The BMQ scores clearly show that the balance of benefits and risks perceived by the patients is clearly in favor of taking the treatments for 96% of them.

The more medications patients took, the more they believed in the importance of their treatment (r= 0.27, p= 0.0064). Women believed more in the harm of treatments (p= 0.0352) and in the overuse of drugs than men (p= 0.0170)

Compliance

The responses to the GIRERD questionnaire are presented in ***Table 2***. Only 11% of patients had good medication adherence with their treatments according to the questionnaire score. One in 10 was considered totally non-adherent.

The more a good medication adherence patients have, the more they believed in the importance of their medication (p = 0.0039).

No significant association was found between the level of medication adherence and age (p = 0.50), level of education (p = 0.52) or number of medications (p = 0.0733).

Knowledge

On average, patients were able to name 49.3% of their treatments. Sixteen percent of patients could name all of their treatments, while 11% of patients could not name any of their treatments.

On average, patients knew 73.1% of the indications for all their usual treatments. When 32 patients were able to name all the indications of their medication, 3 patients could not name any.

Several correlations were found, notably between age and patient knowledge ***(Supplemental Table 2),*** but also with educational level. Indeed, patients with higher education knew more about the indications of their treatments (mean= 85.1±22.8) than patients with no education (mean= 40.9±29.4) (p = 0.0017).

The least cited drug classes were anti-histamines for systemic use (28.6%), analgesics (26.8%), anti-anemic preparations (24.0%) and ophthalmic drugs (20%).

Among the most prescribed drug classes, the most cited were anti-thrombotics (64.7% of the 116 prescriptions), beta-blockers (55.9% of the 59 prescriptions), drugs acting on the renin angiotensin system (49.3% of 67 the prescriptions) and anti-diabetics (46.8% of the 62 prescriptions).

The drug classes for which patients demonstrated inadequate knowledge regarding their indications primarily included cardiology drugs (60%), anti-anemic preparations (48%), diuretics (47.5%), beta-blockers (45.8%) and lipid-lowering drugs (45%).

When patients were asked about their treatments, a large proportion did not spontaneously mention the drugs they took "if needed", in particular analgesics (26,8% of the 82 prescriptions) such as paracetamol or symptomatic drugs such as antihistamines (28,7% of the 14 prescriptions).

A comparison between beliefs, compliance and knowledge was made. The results obtained are detailed in ***Table 3.*** For patients with low adherence, the more they knew the indications of their treatments, the less they feared their harmfulness. And the more they knew how to name treatments, the less they feared overuse.

Importance ratings

Fourteen patients were unable to rate the importance of their treatment because they felt that all their medications were equally important.

Out of the most prescribed drug classes, two had a median importance score of less than 6: nasal preparations (3 prescriptions, median score 5.0) and constipation medications (13 prescriptions, median score 5.5). Those with the highest importance scores were antidiabetics (62 prescriptions, median score 9.5), immunosuppressants (10 prescriptions, median score 10), and antithrombotics (116 prescriptions, median score 9).

Symptomatic medications scored high in importance. Analgesics (82 prescriptions), antihistamines (14 prescriptions), and medications for acid-related disorders (52 prescriptions) all received a median score of 8.

There was no significant correlation between median patient ratings and compliance ($r = -0.13$, $p = 0.3623$).

Discussion

Our study showed that patients perceived their treatments as beneficial rather than worrying. A correlation between medication adherence and beliefs was observed. "Non-adherent" patients

had a more negative overall perception of medication compared to "adherent patients". The level of medication adherence and knowledge of our patients was low. Only 11% of the patients had "good medication adherence", 16% of the patients could perfectly name their treatment and 36% knew all the indications.

In recent years, several studies have assessed treatment representations and their influence on medication adherence. However, to our knowledge, this study is the first to examine patients' beliefs about their chronic treatment in relation to their knowledge and medication adherence in a vascular medicine and surgery department.

Our results regarding the importance attributed by patients to their chronic medication are consistent with the data found in the literature. French studies have evaluated the representation of treatments in chronic pathologies, particularly in asthma (12), diabetes and HIV (10), and bronchopulmonary cancer (14). All these studies have highlighted the importance that patients attach to their medication. Therefore, patients perceive their treatment as beneficial rather than worrisome. Indeed, in our study, 77% of patients were not worried about taking medication and 76% were not disturbed by medication in their daily lives.

Several studies have demonstrated a correlation between patients' representations of their treatment and the level of medication adherence. Horne *et al.* established this link for each of the chronic pathologies studied via the BMQ questionnaire in a cohort of 324 patients with

diverse chronic diseases (asthma, oncology, cardiac and renal diseases). Indeed, the "necessity" score was correlated with good medication adherence and the "concern" score was related to poor medication adherence in each of the diseases studied (11). Although our results could not show a significant correlation but a trend towards the same result. Conducting disease-specific analyses with larger sample sizes could confirm this trend.

A French study also explored correlations between beliefs and medication adherence among patients with chronic diseases in general medical practices (15). Of the 265 patients included in the study, 40.8% had good medication adherence, 53.2% were "moderately adherent" and 6% were "non-adherent". In our study, only 11% of patients were "good adherent". This can be partially explained by a significant difference in the average number of medications taken by patients. In their study, patients had an average of 3.6±2.6 medications, almost three times less than in our study. One of the 6 questions of the GIRERD questionnaire related to the amount of medication to be taken: "Do you think you have too many pills to take" and 67% of our patients answered "yes". This may explain the low rate of "good adherent".

Deat *et al.* highlighted a significant correlation between the degree of adherence and the BMQ scores "concerns", "harmfulness" and "overuse", supporting the trend shown in our study. The absence of a statistical significancy could be explained by an important difference in the number of patients in each compliant group. Only ten patients were "non-adherent". Regarding the

concerns of "non-adherent" patients, our results are consistent with their study: patients were more concerned with their treatment, which may have an impact on medication adherence.

Fall *et al.* conducted a study among diabetic and HIV patients (10). A disease-specific analysis demonstrated significant correlations between medication adherence and the necessity and worry scales. Thus, negative beliefs were predictive of poor adherence. “Non-adherent” patients would therefore have a more negative overall view of medication than adherent patients.

According to the study by Huon *et al.* (16), the average number of medications taken by the elderly is 8 in the 70–80-year-olds, 9.61 in the 80–90-year-olds, 9.92 in the 90–100-year-olds and 8.11 for the over 100-year-olds. Overall, the increase in medication use varies as the population ages. Our patients, with an average age of 70.8 years, took an average of 9.7 medications. Unfortunately, the higher the number of medications, the higher the risk of forgetting or not taking the treatments (17). This high number of medications also has a role in patients' knowledge and beliefs. Our results demonstrated that the more medications patients took, the less they knew about their names and indications. These results are consistent with those reported in the literature (18).

One study showed that knowledge of drug indications varied based on the ATC class. Indeed, the drug classes where indications were not known included cardiovascular drugs (12%),

asthma drugs (5%) and estrogen therapies (5%) (19). In our study, we also noted that indications for cardiovascular drugs were the least known. This observation aligns with the fact that patients in the vascular medicine department have many cardiology medications. It is therefore essential that caregivers take sufficient time with patients to educate and involve them in their care. Persall *et al.* (19) also revealed that the older and less educated the patients were, the less they knew about their treatments. Our results support these findings.

Only 16% of patients could perfectly name their treatment and 36% knew all the indications. In general, the level of knowledge of patients about their treatment was low. However, comparing our results to existing literature is challenging due to disparities in the number of drugs per patient and the number of patients included. Akici *et al.* (20) showed, in a study including 1618 patients with an average of 3.3 drugs per patient, that only 10.9% of patients could correctly name their treatment. Given the average number of medications taken by the patients in our study, over 9, it seems normal that the number of patients who could cite their entire treatment is low in our results. The study by Haidar-Ahmad *et al.* including 351 patients, with a mean number of medications taken of 3.83, described that 80.74% of the medications were known by the patients (21). Persall *et al.,* included 616 patients in their study. Only 13.5% of patients did not know any of the indications. They also noted a significant lack of knowledge of their patients for cardiovascular medications (19).

Although patient knowledge levels and medication adherence were low, the importance they attached to their treatment was high. Patient ratings indicated that the majority of prescribed drug classes were considered important to them. Only four ATC classes scored below average. This outcome confirms the "necessity" score obtained in the BMQ questionnaire. A French study assessed drug-related representations in patients with multiple myeloma (22). The authors estimated the importance the patient placed on his or her medications. Antithrombotic drugs, unlike our study, were rated lower, whereas anticancer drugs scored highest. This significant difference between medications that are all part of the overall management of myeloma could be explained by the degree of information provided to patients. Indeed, while the direct link between anticancer drugs and myeloma can easily be made, the link between antithrombotic drugs and the fatal consequences of myeloma is less intuitive. Our work reports on patients with multiple and varied chronic pathologies, with a large number of prescribed medications. Despite this, few differences were observed between ATC classes and therefore chronic pathologies. For a majority of patients, all treatments carried equivalent importance. Indeed, even if the patients did not spontaneously cite their symptomatic treatments, they gave them a high importance. This is due to the perceived immediate effect of using these treatments. This finding is in alignment with another study (23) which demonstrated that patients exhibited greater familiarity with analgesics compared to cardiovascular drugs, as they could directly

sense their effects. Notably, in our study, patients were very familiar with the effects of their symptomatic medications but did not cite them directly. This individual perception of treatment efficacy has been described as a determining factor in patient adherence to medication (24). Moreover, if representations about treatments impact patient adherence, adherence is also determined by the relationship of trust with the physician. Several studies have shown that the relationship between the physician and the patient has a significant impact on the feeling of usefulness and efficacy of the treatment, but also on adherence (25). Research has indicated that patients exhibit improved medication adherence when they possess sufficient information and a clear understanding of the rationale behind their treatment (26). As described by Peh et al. in their study, various factors contribute to therapeutic adherence, include healthcare professionals. For them, medication adherence depends on patients' perceived needs and beliefs about medication, which are, in turn, influenced by the information and advice provided by the healthcare provider during the medical consultation (27). In our study, the majority of patients reported receiving information about their treatment, but one third felt that this was not sufficient.

In our study, we were interested in the link between beliefs and adherence. Nevertheless, therapeutic adherence represents a multifaceted behavior shaped by a multitude of factors; factors linked to the patient (age for example, beliefs), to the care team (information), to the

disease (asymptomatic or symptomatic), to the treatment (undesirable effects or not), and to social and economic factors (24,27). With enhanced information, efficacious, and secure for their well-being. Consequently, this perception aids in optimizing their medication-taking behavior over an extended period (24).

Assessing patients' beliefs would allow us to better target their priorities, and thus to develop adapted educational actions and tools. Indeed, understanding the mechanisms and potential evolution of the disease will make it easier for patients to assimilate the objectives of their treatments and will facilitate their therapeutic adherence (28).

Strengths and biases

To our knowledge, the representation and beliefs of chronic treatments have not been studied in a vascular medicine and surgery department, in patients with multiple medications and cardiac pathologies. This is a single-center study. It would be of interest to replicate this investigation across multiple centers to achieve outcomes that are both generalizable and transferable.

In our study, the BMQ was used for a combination of several diseases, whereas its French version has only been validated for diabetes and HIV (10). Thus, patients with several chronic

diseases may not have the same representations regarding the treatments for each disease. The scores given by patients on each of their treatments were used to estimate the level of importance given to each medication. Notably, a predominant observation was that for the majority of patients, all their prescribed medications were perceived as equally significant, potentially indicating an absence of prioritization.

Another limitation inherent in our study pertains to the exclusive utilization of a questionnaire to assess adherence, despite the availability of various adherence measurement methods (both direct and indirect). While the questionnaire presents a straightforward, swift, and cost-effective technique, its stand-alone use is less robust. Many authors recommend using at least two methods. In addition, the use of questionnaires tends to overestimate medication adherence (29) which may seem worrying in view of the already low adherence reported in our results. In the context of short-stay inpatients, it was not possible to use direct methods (drug measurements, biological marker measurements), or to use any other indirect method than the questionnaire. Moreover, this would have lengthened the interview time with the patients and thus made the procedure more cumbersome.

Concerning the evaluation of knowledge, the hospitalization of our population certainly had an impact on the real knowledge of the patients about their treatment. In discussion with the doctors, we reached this limit in our study. Being in a stressful environment, in a context of

acute pathology, could potentially have decreased their true knowledge of the names and indications of their treatment, inducing a bias.

One of the exclusion criteria for the study was cognitive impairment. This was assessed clinically but was not confirmed by a specific assessment test such as Mini Mental State Examination (MMSE). This would have again made the protocol and interviews more cumbersome.

Conclusion

The level of knowledge and medication adherence of patients with multiple chronic diseases in surgery and vascular medicine is low. Representations of the disease and of medication have an impact on patients' behaviour. They are determinants of adherence to medication. Identifying patients' beliefs about their chronic treatment allows caregivers to adapt information to patients' needs. Better information from healthcare professionals (physician, nurse, pharmacist, etc.) regarding the indication and efficacy of the prescribed treatment is essential. Combined with the consideration of patients' concerns, particularly regarding tolerance, this will improve the benefit/concern ratio perceived by these patients, and thus increase their compliance. The BMQ may help to identify patients at risk of poor compliance.

392

393

394

Acknowledgments

The authors would like to thank all the staff members of the medicine and vascular surgery for their kind help in performing this study.

Contributors:

DK, JS, MB, SPL and JFH contributed to the study conception and design. Data collection and analysis were performed by CV and DK. The first draft of the manuscript was written by DK and JS, MB, AB, SPL, CV and JFH commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Competing interests

The Author(s) declare(s) that there is no conflict of interest.

Funding

No funding was obtained for this study.

Data sharing statement

The data underlying this article will be shared on reasonable request to the corresponding author.

Bibliography

1. Chassang M, Gautier A. Les maladies chroniques [online]. 2019. https://www.lecese.fr/sites/default/files/pdf/Avis/2019/2019_14_maladies_chroniques.pdf (accessed 21 Januar 2022).

2. WHO Chronic disease report [online]. https://www.who.int/chp/chronic_disease_report/media/information/factsheets_FR_web.pdf (accessed 21 Januar 2022).

3. Briançon S, Guérin G, Sandrin-Berthon B. Maladie chroniques [online]. 2010. 2010-09-adsp-n°72-maladies-chroniques-et-ETP.pdf. (accessed 21 Januar 2022)

4. Laroche JP, Guilbert B, Miserey G, et al. Conseil National Professionnel de Médecine Vasculaire, Médecine Vasculaire - Etat des lieux. [online]. 2015. https://www.portailvasculaire.fr/sites/default/files/docs/livre_blanc_2015.pdf (accessed 26 July 2022)

5. Monégat M, Sermet C, Perronnin M, et al. La polymedication definitions mesures et enjeux [online]. 2014. https://www.irdes.fr/recherche/questions-d-economie-de-la-sante/204-la-polymedication-definitions-mesures-et-enjeux.pdf (accessed 3 Januar 2022)

6. Le Cossec C. La polymédication au regard de différents indicateurs de sa mesure: impact sur la prévalence, les classes thérapeutiques concernées et les facteurs associés. [online]. 2015. https://www.irdes.fr/recherche/rapports/562-la-polymedication-au-regard-de-differents-indicateurs-de-sa-mesure.pdf (accessed 3 Januar 2022)

7. Schneider MP, Herzig L, Hugentobler Hampai D, et al. Revue Medicale Suisse. Adhésion thérapeutique du patient chronique : des concepts à la prise en charge ambulatoire [online]. 2013. https://www.revmed.ch/revue-medicale-suisse/2013/revue-medicale-suisse-386/adhesion-therapeutique-du-patient-chronique-des-concepts-a-la-prise-en-charge-ambulatoire (accessed 3 Januar 2022)

8. Turrise S. Illness Representations, Treatment Beliefs, Medication Adherence, and 30-Day Hospital Readmission in Adults With Chronic Heart Failure: A Prospective Correlational Study. J Cardiovasc Nurs. 2016;31(3):245-54. doi: 10.1097/JCN.0000000000000249

9. Horne R, Weinman J, Hankins M. The beliefs about medicines questionnaire: The development and evaluation of a new method for assessing the cognitive representation of medication. Psychol Health. 1999;14(1):1-24. doi: 10.1080/08870449908407311

10. Masson E. EM-Consulte. Validation of the French version of the Beliefs about Medicines Questionnaire (BMQ) among diabetes and HIV patients [online]. 2014.

https://www.em-consulte.com/article/934270/validation-of-the-french-version-of-the-beliefs-ab (accessed 3 Januar 2022)

11. Horne R, Weinman J. Patients' beliefs about prescribed medicines and their role in adherence to treatment in chronic physical illness. J Psychosom Res. 1999;47(6):555-67. doi: 10.1016/S0022-3999(99)00057-4

12. Charles C, Ninot G, Sultan S. Représentations des patients et observance des traitements par corticostéroïdes inhalés dans l'asthme. Revue systématique sur la période 1999–2009. Rev Mal Respir. 2011;28(5):626-35. doi: 10.1016/j.rmr.2010.11.003

13. Girerd X, Hanon O, Anagnostopoulos K, et al. Assessment of antihypertensive compliance using a self-administered questionnaire: development and use in a hypertension clinic. Presse Medicale Paris Fr 1983. 2001;30(21):1044-8.

14. Torrecillas S, Perrot E, Gérinière L, et al. Croyances des patients envers les thérapies ciblées orales et leur influence sur l'observance dans le cancer broncho-pulmonaire : une étude pilote prospective. Rev Pneumol Clin. 2016;72(1):25-34. doi: 10.1016/j.pneumo.2015.03.005

15. Déat et al. Croyances à propos des médicaments et observance chez les patients atteints de maladie chronique. Exerc Rev Francoph Médecine Générale. 28(138):436.

16. Huon JF, Lenain E, LeGuen J, et al. How Drug Use by French Elderly Patients Has Changed During the Last Decade. Drugs - Real World Outcomes. 2015;2(4):327-33. doi: 10.1007/s40801-015-0041-6

17. Bruyer B. Évaluation des connaissances que les patients ont de leurs traitements et du temps d'éducation thérapeutique en consultation de médecine générale ou en pharmacie. Médecine humaine et pathologie. 2020. ffdumas-03054136f

18. Chung MK, Bartfield JM. Knowledge of prescription medications among elderly emergency department patients. Ann Emerg Med. 2002;39(6):605-8. doi: 10.1067/mem.2002.122853

19. Persell SD, Heiman HL, Weingart SN, et al. Understanding of drug indications by ambulatory care patients. Am J Health Syst Pharm. 2004;61(23):2523-7. doi: 10.1093/ajhp/61.23.2523

20. Akici A, Kalaça S, Uğurlu MU, et al. Patient knowledge about drugs prescribed at primary healthcare facilities. Pharmacoepidemiol Drug Saf. 2004;13(12):871-6. doi: 10.1002/pds.1020

21. Haidar-Ahmad F. Les facteurs influençant la connaissance du traitement chronique : étude menée sur 351 patients dans les 14ème, 15ème et 16ème arrondissements de Marseille. Sciences du Vivant [q-bio]. 2019. ffdumas-02274110f

22. Huon JF, Fronteau C, Caffin AG, et al. Évaluation des représentations relatives aux médicaments chez les patients atteints de myélome multiple. Educ Thérapeutique Patient - Ther Patient Educ. EDP Sciences; 2017;9(1):10101. doi: 10.1051/tpe/2017002

23. Oudjhani M, Foison O, Astier A. Est-ce que les sujets âgés connaissent leurs traitements ? J Pharm Clin. 2012;31(2):113-6. doi: 10.1684/jpc.2012.0215

24. Johnson MJ. The Medication Adherence Model: a guide for assessing medication taking. Research and theory for nursing practice, 16(3), 179–192. 2002. https://doi.org/10.1891/rtnp.16.3.179.53008

25. Fuertes JN, Mislowack A, Bennett J, et al. The physician–patient working alliance. Patient Educ Couns. 2007;66(1):29-36. doi: 10.1016/j.pec.2006.09.013

26. Monnier G, Charpiat B, Serratrice F, et al. Evaluation de l'apport d'une consultation de pharmacie sur les connaissances des patients transplantés hépatiques. Therapies. 2003;58(4):305-11. doi: 10.2515/therapie:2003047

27. Peh, K.Q.E., Kwan, et al. An Adaptable Framework for Factors Contributing to Medication Adherence: Results from a Systematic Review of 102 Conceptual Frameworks. J GEN INTERN MED 36,

28. Kelly M, McCarthy S, Sahm LJ. Knowledge, attitudes and beliefs of patients and carers regarding medication adherence: a review of qualitative literature. Eur J Clin Pharmacol. 2014;70(12):1423-31. doi: 10.1007/s00228-014-1761-3

29. Allenet B, Baudrant M, Lehmann A, et al. Comment évaluer l'adhésion médicamenteuse ? Le point sur les méthodes. Ann Pharm Fr. 2013;71(2):135-41. doi: 10.1016/j.pharma.2012.10.001

Legends

Figure 1: Responses to the BMQ questionnaire (percentage of responses among the 100 patients)

Tables

Table 1. *BMQ score results - Beliefs*

BMQ* - Beliefs	**N = 100**	**Male N = 69**	**Female N = 31**	**p-value**
Specific Beliefs - Necessity	21.9±3.5 [8.0;25.0]	21.7±3.6	22.2±3.1	0,4822
Specific Beliefs - Concerns	11.1±4.8 [5.0;23.0]	10.5±4.4	12.5±5.5	0.0509
General Beliefs - Harm	9.1±3.2 [4.0;17.0]	8.6±3.0	10.1±3.5	**0.0352**
General Beliefs - Overuse	10.3±3.4 [4.0;17.0]	9.8±3.4	11.5±3.3	**0.0170**
BMQ Necessity - BMQ Concern > 0†	96 (96.0%)	66 (95.7%)	30 (96.0%)	1.0000

Results are presented as mean ± standard deviation [minimum-maximum] or frequencies and percentages

Specific belief scores range from 5 to 25 and general belief scores range from 4 to 20. A high score indicates a strong belief.

*BMQ: Belief Medical Questionnaire

†BMQ "necessity" - BMQ "concern" > 0 means that the beneficial character is superior to the worrying character.

Table 2. *Responses to the GIRERD questionnaire and correlations between compliance and beliefs (N=100)*

Questions and number of positive responses				**N (%)**
Did you forget to take your medication this morning?				1 (1.0%)
Since your last visit, have you run out of medication?				7 (7.0%)
Have you ever taken your medication late compared to the usual time?				43 (43.0%)
Have you ever not taken your medication because your memory fails you some days?				23 (23.0%)
Have you ever not taken your medication because some days you feel that your medication is doing you more harm than good?				9 (9.0%)
Do you think you have too many pills to take?				61 (61.0%)
	Good adherent N = 11 (11.0%)	**Low adherent** N = 79 (79.0%)	**Non-adherent** N = 10 (10.0%)	p-value
Specific Beliefs - Necessity	21.0 [6.0;12]	23.0 [21.0;25.0]	23.0 [16.0;24.0]	0.6487
Specific Beliefs - Concerns	9.0 [6.0;12.0]	11.0 [6.0;14.0]	17.0 [9.0;20.0]	0.1163
BMQ Necessity - BMQ Concern > 0†	11 (100.0%)	78 (98.7%)	7 (70.0%)	**0.0039**
General Beliefs - Harm	9.0 [6.0;12.0]	8.0 [6.0 ;11.0]	11.5[9.0 ;16.0]	0.0739
General Beliefs - Overconsumption	8.0 [5.0 ;12.0]	10.0 [8.0 ;13.0]	13.0 [9.0 ;16.0]	0.1086

The results are presented in median [1st Quartile; 3rd Quartile] for quantitative variables and in the form of frequencies (%) for qualitative variables

Specific belief scores range from 5 to 25 and general belief scores range from 4 to 20. A high score indicates a strong belief.

†BMQ "necessity" - BMQ "concern" > 0 means that the beneficial character is superior to the worrying character.

BMQ: Belief Medical Questionnaire

522 ***Table 3****. Correlation between adherence, beliefs and knowledge about their treatments for the*

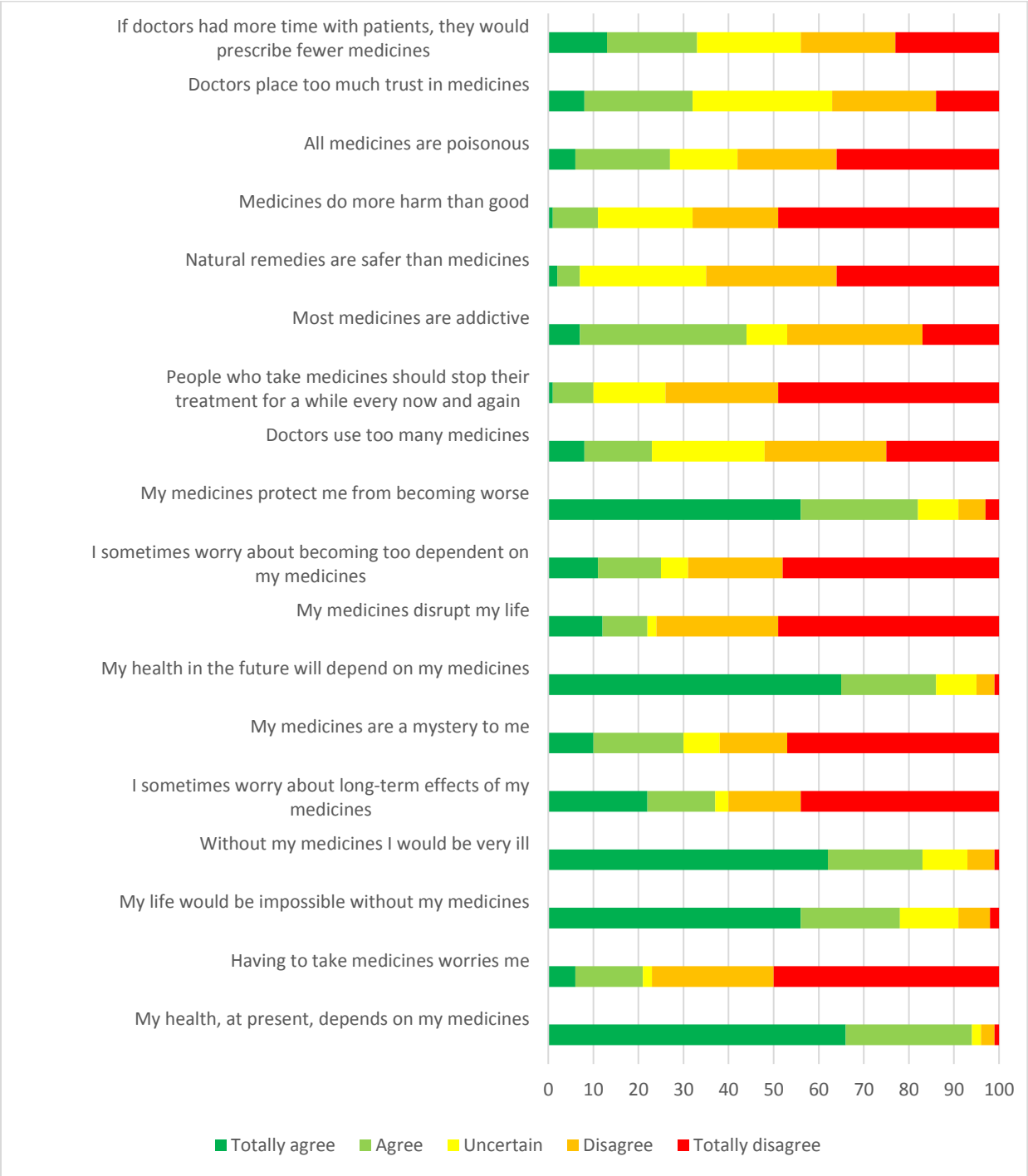
523 *100 patients*

524

	Beliefs	**Drugs mentionned**		**Known indications**	
		r	p	r	p
Good adherent (N=11)	Specific Beliefs - Necessity	-0.22	0.5220	0.17	0.6185
	Specific Beliefs - Concerns	-0.01	0.9837	-0.11	0.7403
	General Beliefs - Harm	0.07	0.8488	0.15	0.6686
	General Beliefs - Overuse	0.37	0.2651	0.26	0.442
Low adherent (N=79)	Specific Beliefs - Necessity	0.01	0.9540	-0.07	0.5457
	Specific Beliefs - Concerns	-0.12	0.2994	-0.11	0.3491
	General Beliefs - Harm	-0.21	0.0689	-0.30	**0.0069**
	General Beliefs - Overuse	-0.23	**0.0401**	-0.21	0.0630
Non-adherent (N=10)	Specific Beliefs - Necessity	-0.35	0.3216	-0.43	0.2149
	Specific Beliefs - Concerns	0.41	0.2434	0.44	0.2064
	General Beliefs - Harm	0.21	0.5643	0.57	0.0858
	General Beliefs - Overuse	0.38	0.2726	0.47	0.1677

525

Figure 1: *Responses to the BMQ questionnaire (percentage of responses among the 100 patients)*



Supplemental Table :

Supplemental Table 1. *Characteristics of the population (N=100) and the drugs (N=965)*

Characteristics of patients	**N=100**
Female sex	31 (31.0%)
Age (years)	70.8 ± 10.7 [38.0;92.0]
Time since first chronic treatment (years)	19.4 ± 12.4 [0.5;58.0]
Level of study	
Secondary level	45 (45.0%)
Higher study	24 (24.0%)
Primary level	24 (24.0%)
Lack of study	7 (7.0%)
Socio-professional category	
Workers	31 (31.0%)
Intermediate professions	18 (18.0%)
Employees	17 (17.0%)
Executives, Higher intellectual professions	14 (14.0%)
Craftsmen, Shopkeeper, Compagny managers	12 (12.0%)
Farmer	5 (5.0%)
Other†	3 (3.0%)
Lifestyle	
Circled	91 (91.0%)
Alone	9 (9.0%)
Organization around medication intake	
Autonomous	83 (83.0%)
Help from relatives (partner, children)	11 (11.0%)
Assistance from a nurse	6 (6.0%)
Information received at the start of treatment	87 (87.0%)
Source of information	
From the general practitioner	73 (73.0%)
From the specialist doctor	61 (61.0%)
From the pharmacist	46 (46.0%)
From family and friends	5 (5.0%)
Information received perceived as sufficient by the patient	64 (64.0%)
Need for additional research (Internet, books, magazines, leaflets)	27 (27.0%)

Drug Characteristics	**N=965**
Number of drugs per patient	9.7 ± 3.6 [5;21]
ATC class of drugs	
Cardiovascular (C)	310 (32.0%)
Alimentary tract and metabolism (A)	190 (19.8%)
Nervous System (N)	175 (18.0%)
Blood and blood-forming organs (B)	141 (14.6%)
Respiratory system(R)	47 (4.9%)
Systemic hormones, excluding sex hormones (H)	19 (2.0%)
Other‡	83 (8.7%)

Results are presented as mean ± standard deviation [minimum-maximum] for quantitative variables and as counts (%) for qualitative variables

*To the question "Since when have you been taking your first chronic treatment?", 4 patients were unable to answer.

†Other occupations: Housewife (2%), No occupation (1%)

‡Other ATC class: J-General anti-infectives for systemic use (0.8%), L-Antineoplastics and immunomodulators (1. 6%), P-Antiparasitic, insecticides (0.1%), V-Miscellaneous (0.6%), D-Dermatological drugs (0.5%), M-Muscle and skeletal (1.4%), S-Sensory organs (1%), G-Genitourinary system and sex hormones (1.7%), No ATC class (1%)

Supplemental Table 2. *Correlation between different age categories and patients' knowledge (drugs and indications cited) (N = 100)*

	Age (years)	**[30-59]** **N=10**	**[60-69]** **N=28**	**[70-79]** **N=46**	**[80 and more]** **N=16**	**p-value**
Percentage of drugs cited	Median	83.3	46.4	40.0	28.6	
	[Q1;Q3]	[66.7;100.0]	[29.7;74.3]	[18.2;71.4]	[0.0;66.4]	**0.0193**
	[Min-Max]	[20.0 ;100.0]	[0.0;100.0]	[0.0;100.0]	[0.0;100.0]	
Percentage of known indications	Median	100.0	75	80.9	84.5	
	[Q1;Q3]	[82.4;100.0]	[55.2;90.5]	[54.5;100.0]	[39.4;100.0]	0.0761
	[Min-Max]	[60.0;100.0]	[23.1;100.0]	[0.0;100.0]	[0.0;100.0]	

Q1 : First Quartile ; Q3 : Third quartile ; Min : minimum ; Max : maximum

Supplemental Files 1 : Global questionnaire

Patient n°: ……..
Length of the interview: ……

Socio-demographic information :

Gender: Age: Lifestyle: ☐ Married ☐ Single ☐ Children

Origins:

Level of study:

Socio-professional category: ☐ Farmer ☐ Craftsmen, Shopkeeper, Compagny managers

☐ Executives, Higher intellectual professions ☐ Professions intermédiaires

☐ Employees ☐ Workers Other:……

Chronic treatment :

Number of medications on the prescription:

How long have you been taking your first chronic treatment?

Informations :

- Have you ever had your treatments explained to you? Yes ☐ No ☐
- Do you feel you have received enough information about your treatments? Yes ☐ No ☐
- From whom did you get information about your treatments?
    - Specialist
    - General practitioner
    - Pharmacist
    - Family

Treatment management :

- Who manages your treatments?
    - Myself
    - A nurse
    - A family member

Knowledge of my chronic treatment :

- *If the patient forgets treatments, the caregiver will quote the medication.*
- *A score between 0 and 10 should be given by the patient to estimate the importance he/she gives to his/her treatment. (0: not at all important, 10: Essential)*

My medications	Cited	Indication	Importance

Do you have any difficulties with your treatments?

……

……

……

Number of known medications :

Supplemental Files 2 : Belief Medical Questionnaire

Patient n°:

Score:

1: Totally disagree, 2: Disagree, 3: Uncertain, 4: Agree, 5: Totally agree

Specific Beliefs :

1. My health, at present, depends on my medicines:
2. Having to take medicines worries me:
3. My life would be impossible without my medicines:
4. Without my medicines I would be very ill:
5. I sometimes worry about long-term effects of my medicines:
6. My medicines are a mystery to me:
7. My health in the future will depend on my medicines:
8. My medicines disrupt my life:
9. I sometimes worry about becoming too dependent on my medicines:
10. My medicines protect me from becoming worse:

General Beliefs :

11. Doctors use too many medicines:
12. People who take medicines should stop their treatment for a while every now and again:
13. Most medicines are addictive:
14. Natural remedies are safer than medicines:
15. Medicines do more harm than good:
16. All medicines are poisonous:
17. Doctors place too much trust in medicines:
18. If doctors had more time with patients, they would prescribe fewer medicines:

Supplemental Files 3 : GIRERD questionnaire

Assessment of medication compliance

Patient n° :

	YES	NO
Did you forget to take your medication this morning?		
Since your last visit, have you run out of medication?		
Have you ever been late taking your medication?		
Have you ever not taken your medication because your memory fails you some days?		
Have you ever not taken your medication, because some days you feel that your treatment is doing you more harm than good?		
Do you think you have too many pills to take?		

Supplemental Files 4 : The local ethics committee

AVIS 22-06-2201
Groupe Nantais d'Ethique dans le Domaine de la Santé (GNEDS)

Nom du protocole Code et versioning	**Croyances et représentations chez les patients polymédiqués en chirurgie et médecine vasculaire**

Investigateur principal	Dr JF HUON
Lieu de l'étude	CHU NANTES
Type de l'étude	Monocentrique, prospective, exploratoire, observationnelle
Type patients/participants	Patients polymédiqués hospitalisés en chirurgie et médecine vasculaire
Nombre de patients/participants prévus	100
Objectif principal	Evaluation de la croyance des patients sur leurs traitements habituels
Objectif secondaire	Connaissance et importance données par le patient à chacun de ses traitements Adhésion médicamenteuse

Documents communiqués

Justification de l'étude	OUI
Méthodologie	OUI
Lettre d'information et lettre de consentement	OUI

Remarque générale
Le GNEDS formule d'abord la remarque qu'il n'a pas pour mission de donner un avis sur les aspects scientifiques du protocole, en particulier sur l'adéquation de la méthodologie aux objectifs poursuivis par l'étude. Il ne tient compte des données d'ordre scientifique et méthodologique que dans la mesure où elles ont des implications d'ordre éthique. Dans le cas présent, il se bornera à constater que les objectifs de cette étude et sa méthodologie sont conformes aux principes de l'éthique.

Confidentialité

Confidentialité	OUI
Anonymat	OUI
CNIL	RGPD

Commentaires :

Information et consentement

Consentement :

Recueil nécessaire	OUI
Type consentement préférable	ORAL
Traçabilité dans le dossier	NA

Commentaires :

Lettre information précisant :

Titre de l'étude	OUI
But de l'étude	OUI
Déroulement de l'étude	OUI
Prise en charge courante inchangée	OUI
Possibilité de recevoir résultats de l'étude	OUI
Traçabilité dans le dossier	NA

Commentaires :

Conclusion

Avis favorable	OUI
Révision nécessaire selon commentaires	
Avis défavorable	

GNEDS : Professeur Paul BARRIERE

Nantes le 22 juin 2022

Reporting checklist for cross sectional study.

An observational and prospective study: Evaluation of beliefs and representations of chronic treatments of polymedicated patients hospitalized in medicine and vascular surgery

D. Kotry *et al.*

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the STROBE cross sectionalreporting guidelines, and cite them as:

von Elm E, Altman DG, Egger M, Pocock SJ, Gotzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies.

		Reporting Item	Page Number
Title and abstract			
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	2-3
Introduction			

Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	#3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	#4	Present key elements of study design early in the paper	5
Setting	#5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of selection of participants.	5
	#7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for for exposed and unexposed groups if applicable.	5-6
Bias	#9	Describe any efforts to address potential sources of bias	NA
Study size	#10	Explain how the study size was arrived at	5
Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	6
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	6
Statistical methods	#12b	Describe any methods used to examine subgroups and interactions	NA
Statistical methods	#12c	Explain how missing data were addressed	NA

Statistical methods	#12d	If applicable, describe analytical methods taking account of sampling strategy	NA
Statistical methods	#12e	Describe any sensitivity analyses	NA
Results			
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	7
Participants	#13b	Give reasons for non-participation at each stage	NA
Participants	#13c	Consider use of a flow diagram	NA
Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	7
Descriptive data	#14b	Indicate number of participants with missing data for each variable of interest	Supplemental Table 1
Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	7-10 + tables
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7-10 + tables
Main results	#16b	Report category boundaries when continuous variables were categorized	NA
Main results	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA

Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	#18	Summarise key results with reference to study objectives	10
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	15
Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	10-16
Generalisability	#21	Discuss the generalisability (external validity) of the study results	14
Other Information			
Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

BMJ Open

An observational and prospective study: Evaluation of beliefs and representations of chronic treatments of polymedicated patients hospitalized in a vascular medicine and surgery department

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2023-073250.R2
Article Type:	Original research
Date Submitted by the Author:	21-Oct-2023
Complete List of Authors:	Kotry, Dounia; University Hospital Centre Nantes, Saillard, Justine; CHU Nantes, Pharmacy Bonsergent, Marion; CHU Nantes, Pharmacy Volteau, Christelle; Centre Hospitalier Universitaire de Nantes Benichou, Antoine; CHU Nantes, Internal Medicine Prot-Labarthe, Sonia; Nantes Université, Pharmacie; ECEVE HUON, Jean-François; University Hospital Centre Nantes, Clinical Pharmacy; University of Nantes, Faculty of Pharmacy, Clinical Pharmacy department
Primary Subject Heading:	Cardiovascular medicine
Secondary Subject Heading:	Patient-centred medicine
Keywords:	Patient-Centered Care, CLINICAL PHARMACOLOGY, Patient Reported Outcome Measures

I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our licence.

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which Creative Commons licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

An observational and prospective study: Evaluation of beliefs and representations of chronic treatments of polymedicated patients hospitalized in a vascular medicine and surgery department

Dounia KOTRY[1], Justine SAILLARD[1], Marion BONSERGENT[1], Christelle VOLTEAU[2], Antoine BENICHOU[3], Sonia PROT-LABARTHE[4], Jean-François HUON[5]

University degree:

Dounia KOTRY, PharmD

Justine SAILLARD, PharmD

Marion BONSERGENT, PharmD

Christelle VOLTEAU

Antoine BENICHOU, MD

Sonia PROT-LABARTHE, PharmD, PhD

Jean-François HUON, PharmD, PhD

Affiliations:

1. Nantes Université, CHU Nantes, Pharmacie, F-44000, France

2. Plateforme de Méthodologie et Biostatistique, DRi du CHU de Nantes, Nantes, France

3. Nantes Université, CHU Nantes, Médecine interne, F-44000, France

4. Nantes Université, CHU Nantes, Pharmacie, F-44000, France, Université Paris Cité, INSERM, ECEVE, F-75010 Paris, France

5. Nantes Université, Univ Tours, CHU Nantes, CHU Tours, Pharmacie, INSERM, MethodS in Patients-centered outcomes and HEalth Research, SPHERE, F-44000 Nantes, France

Corresponding author:

Dounia KOTRY, dounia.kotry@gmail.com

Mails:

Justine SAILLARD: justine.saillard@chu-nantes.fr

Marion BONSERGENT: marion.bonsergent@chu-nantes.fr

Christelle VOLTEAU: christelle.volteau@chu-nantes.fr

Antoine BENICHOU: antoine.benichou@chu-nantes.fr

Sonia PROT-LABARTHE: sonia.protlabarthe@chu-nantes.fr

Jean-François HUON: jeanfrancois.huon@chu-nantes.fr

Abstract

Objectives: Today, the involvement of patients in their care is essential. As the population ages increases, the number of patients with chronic diseases is increasing. In the vascular medicine and surgery departments, patients are polymedicated and mostly suffer from several chronic diseases. Approximately 50% of patients with a chronic disease are not adherent. Among the factors that can influence therapeutic adherence are the beliefs and representations of patients. To evaluate the beliefs and representations of chronic treatments in patients with multiple medications and hospitalized in a vascular medicine and surgery department, and to evaluate the medication adherence, the knowledge, and the importance patients attach to their treatments.

Design: Observational, prospective and a single-center study.

Setting: The study was conducted in a French tertiary hospital center of around 3000 beds in 9 institutions.

Participants: Adult polymedicated (i.e minimum of 5 chronic treatments) patients hospitalized in a vascular medicine and surgery department were included after application of the exclusion criteria.

Methods: Patient interviews were carried out in the department and were based on three interviewer administered questionnaires (a global questionnaire, the Belief Medical Questionnaire (BMQ) and the GIRERD questionnaire).

Results: Our study showed that patients perceived their treatments as beneficial rather than worrying. A correlation between medication adherence and beliefs was observed. "Non-adherent" patients had a more negative overall view of medication than "adherent" patients. The level of compliance and knowledge of our patients was low. Only 11% of the patients were "good adherent", 16% of the patients could perfectly name their treatment and 36% knew all the indications.

Conclusion: Knowledge of treatment representation and beliefs are central to understanding patient behaviour. Considering patients' representations will allow the identification of levers,

and the development of actions and educational tools adapted to improve their adherence, their knowledge and therefore their drug management.

Data availability statement: Data are available upon reasonable request

Strengths and limitations of this study

- This study is pioneering in its examination of the representation and beliefs associated with chronic treatments within a vascular medicine and surgery department.
- We employed validated and widely accepted questionnaires to assess beliefs and measure medication adherence.
- Nonetheless, it is crucial to acknowledge that this study was conducted at a single center, which may limit the broader applicability of the findings.
- It is worth noting that medication adherence questionnaires often tend to overestimate adherence, underscoring the importance of employing multiple measurement methods.

Introduction

A chronic disease can be defined as a long-term condition that usually progresses slowly and requires long-term treatment and care (1). It is also characterized by its impact on the quality of life of patients. About twenty million people in France are affected by a chronic disease (1), the most frequent being cardiovascular, cerebral, respiratory and metabolic diseases, as well as malignant tumors (2). Today, the prevalence of chronic diseases is rising sharply and can be explained by the aging of the population and the increase in life expectancy. They are therefore among the most common health care problems, with a major impact on public health and the economy (3).

In the vascular medicine and surgery department, the majority of patients have one or more chronic diseases and are polymedicated (4). Polymedication is defined as "the administration of many drugs simultaneously or the administration of an excessive number of drugs" (5,6). Furthermore, all chronic diseases require long-term management with an investment by both healthcare professionals and the patient. For this, a good level of information on the disease and treatments is necessary for the patient to avoid the risks of poor compliance. According to the WHO (7), 50% of patients do not adhere to their chronic treatment, even though this adherence is essential for the control of the chronic disease. Indeed, loss of adherence to treatment leads

to a decrease in therapeutic efficacy and exposes the patient to complications of their disease and to therapeutic failure (7).

The representations of treatments are factors that influence therapeutic adherence (8). This refers to each individual's knowledge, explanations and ideas about his disease. Representations are linked to the patient's behaviour, cultural, social and family background, education, professional activity, etc. (9). They have multiple origins and varies from one individual to another. Today, the representation of the disease, but also of treatments, is central to understanding the behaviour of patients in their health care journey. Representations and beliefs have been studied in certain chronic diseases, notably HIV, diabetes, hypertension, asthma, etc. (9-12).

However, to our knowledge, they have not been studied in a vascular medicine and surgery department fields, when it comes to hospitalized patients with multiple medications.

The main objective of this study was to evaluate the beliefs and representations of chronic treatments in multi-medicated patients hospitalized in a vascular medicine and surgery department Secondly, the patients' knowledge of their treatments, the importance given by the patient to each of their treatment and the medication adherence were assessed.

Material and methods

This was an observational, prospective, single-center study conducted in a French tertiary hospital center of around 3000 beds in 9 institutions.

Patients included had to be over 18 years of age and hospitalized in the vascular medicine and surgery department, which comprises 28 beds. Patients had to be polymedicated prior the hospitalization. Drawing on literature data (5) and the experience of our medication reconciliation activity, the threshold of five medications as a reference to designate polymedicated patients was established.

Patients who were unable to participate in an interview because of cognitive impairment or language barrier were not included. All patients underwent a medication review on admission to the vascular medicine and surgery department to obtain a complete record of their usual treatment. The patient inclusion period was from early March 2022 to late June 2022. All participants provided oral consent.

The study was based on three questionnaires completed during the patient's hospitalization. All questionnaires were interviewer administered and concerned the treatments patients were taking prior to hospitalization.

1/ a global questionnaire, specifically developed for the study, regarding the patient's sociodemographic data, their usual treatments identified by the reconciliation and their

medication management, the information received about his treatments, the knowledge he had of his treatments (name and indication) as well as the importance he gave to each medication (scored from 1 to 10).

2/ the BMQ (Belief Medical Questionnaire). It allows for the evaluation of different specific dimensions of patients' beliefs about their medical treatments. It consists of 18 items divided into two parts: specific beliefs (patients' representations of their medical prescriptions - 10 items) and general beliefs (beliefs in medicine in general - 8 items). A 5-point Likert scale was used for the responses. For each question, a total score was calculated by adding the item scores. Each specific belief could get a score between 5 and 25, and each general belief a score between 4 and 20. The higher the scores, the more important the beliefs are. For specific beliefs, a differential score is calculated by subtracting the specific concern from the specific need. A score greater than 0 means that the perceived need for treatment is greater than the concerns. The validated French version of this questionnaire was used (10).

3/ the validated GIRERD medication adherence questionnaire, composed of 6 items (13). GIRERD score: six negative ("no") responses: patient is "good adherent". Four or five "no" responses: patient is "low-adherent ". Two or three "no" responses: the patient is "non-adherent".

The interviews were conducted by the first author.

Characteristics of the patients and the drugs were presented with mean, standard deviation, minimum and maximum for the quantitative variable and with frequency and percentage of each category. Spearman's correlation coefficient were used to measure association between two continuous variables. Comparison of groups were performed using Chi-squared tests for categorical variables and using ANOVA, or Kruskall-Wallis tests for continuous variables, depending of the normality or not of the distribution. The statistical significance was established with a threshold to 5%. All analyses were performed using SAS® version 9.4 software.

This study was approved by the local ethics committee (Groupe Nantais d'Ethique dans le Domaine de la Santé) on June 22th 2022 (GNEDS 20220622).

Patient and Public Involvement: No patient involved

Results

Characteristics of the patients and their treatments

Over the period, three hundred sixty five patients underwent a medication reconciliation. Of the patients eligible and available at the time of service, one hundred patients were included in the study. All patients completed the study and were analyzed. The characteristics of the patients and their treatments are presented in ***Supplemental Table 1.*** Patients reported being treated for an estimated period of 19.4(± 12.4) years. On average, 9.4 (± 3.6) drugs were prescribed simultaneously, mostly for cardiovascular (32%), digestive (19.8%) or neurological (18%)

diseases. The majority of patients were informed about their treatments by a doctor, but more than a quarter (27%) felt the need for more information.

Women felt that they received less information about drugs from healthcare professionals than men (48.4% vs. 71.0%, p = 0.0292).

Beliefs

The results of the BMQ questionnaire for the population are presented in ***Figure 1*** and the BMQ score values are detailed in ***Table 1.*** Overall, patients said that their medication helped them not to feel worse, that without it they would be sicker or that their life would be impossible. They were aware that their future life depended on taking them. However, almost one in three patients felt that doctors were too trusting of medication, and that they would prescribe less if they had more time. The BMQ scores clearly show that the balance of benefits and risks perceived by the patients is clearly in favor of taking the treatments for 96% of them.

The more medications patients took, the more they believed in the importance of their treatment (r= 0.27, p= 0.0064). Women believed more in the harm of treatments (p= 0.0352) and in the overuse of drugs than men (p= 0.0170)

Compliance

The responses to the GIRERD questionnaire are presented in ***Table 2***. Only 11% of patients had good medication adherence with their treatments according to the questionnaire score. One in 10 was considered totally non-adherent.

The more a good medication adherence patients have, the more they believed in the importance of their medication (p = 0.0039).

No significant association was found between the level of medication adherence and age (p = 0.50), level of education (p = 0.52) or number of medications (p = 0.0733).

Knowledge

On average, patients were able to name 49.3% of their treatments. Sixteen percent of patients could name all of their treatments, while 11% of patients could not name any of their treatments. On average, patients knew 73.1% of the indications for all their usual treatments. When 32 patients were able to name all the indications of their medication, 3 patients could not name any.

Several correlations were found, notably between age and patient knowledge ***(Supplemental Table 2),*** but also with educational level. Indeed, patients with higher education knew more about the indications of their treatments (mean= 85.1±22.8) than patients with no education (mean= 40.9±29.4) (p = 0.0017).

The least cited drug classes were anti-histamines for systemic use (28.6%), analgesics (26.8%), anti-anemic preparations (24.0%) and ophthalmic drugs (20%).

Among the most prescribed drug classes, the most cited were anti-thrombotics (64.7% of the 116 prescriptions), beta-blockers (55.9% of the 59 prescriptions), drugs acting on the renin angiotensin system (49.3% of 67 the prescriptions) and anti-diabetics (46.8% of the 62 prescriptions).

The drug classes for which patients demonstrated inadequate knowledge regarding their indications primarily included cardiology drugs (60%), anti-anemic preparations (48%), diuretics (47.5%), beta-blockers (45.8%) and lipid-lowering drugs (45%).

When patients were asked about their treatments, a large proportion did not spontaneously mention the drugs they took "if needed", in particular analgesics (26,8% of the 82 prescriptions) such as paracetamol or symptomatic drugs such as antihistamines (28,7% of the 14 prescriptions).

A comparison between beliefs, compliance and knowledge was made. The results obtained are detailed in ***Table 3.*** For patients with low adherence, the more they knew the indications of their treatments, the less they feared their harmfulness. And the more they knew how to name treatments, the less they feared overuse.

Importance ratings

Fourteen patients were unable to rate the importance of their treatment because they felt that all their medications were equally important.

Out of the most prescribed drug classes, two had a median importance score of less than 6: nasal preparations (3 prescriptions, median score 5.0) and constipation medications (13 prescriptions, median score 5.5). Those with the highest importance scores were antidiabetics (62 prescriptions, median score 9.5), immunosuppressants (10 prescriptions, median score 10), and antithrombotics (116 prescriptions, median score 9).

Symptomatic medications scored high in importance. Analgesics (82 prescriptions), antihistamines (14 prescriptions), and medications for acid-related disorders (52 prescriptions) all received a median score of 8.

There was no significant correlation between median patient ratings and compliance ($r = -0.13$, $p = 0.3623$).

Discussion

Our study showed that patients perceived their treatments as beneficial rather than worrying. A correlation between medication adherence and beliefs was observed. "Non-adherent" patients

had a more negative overall perception of medication compared to "adherent patients". The level of medication adherence and knowledge of our patients was low. Only 11% of the patients had "good medication adherence", 16% of the patients could perfectly name their treatment and 36% knew all the indications.

In recent years, several studies have assessed treatment representations and their influence on medication adherence. However, to our knowledge, this study is the first to examine patients' beliefs about their chronic treatment in relation to their knowledge and medication adherence in a vascular medicine and surgery department.

Our results regarding the importance attributed by patients to their chronic medication are consistent with the data found in the literature. French studies have evaluated the representation of treatments in chronic pathologies, particularly in asthma (12), diabetes and HIV (10), and bronchopulmonary cancer (14). All these studies have highlighted the importance that patients attach to their medication. Therefore, patients perceive their treatment as beneficial rather than worrisome. Indeed, in our study, 77% of patients were not worried about taking medication and 76% were not disturbed by medication in their daily lives.

Several studies have demonstrated a correlation between patients' representations of their treatment and the level of medication adherence. Horne *et al.* established this link for each of the chronic pathologies studied via the BMQ questionnaire in a cohort of 324 patients with

diverse chronic diseases (asthma, oncology, cardiac and renal diseases). Indeed, the "necessity" score was correlated with good medication adherence and the "concern" score was related to poor medication adherence in each of the diseases studied (11). Although our results could not show a significant correlation but a trend towards the same result. Conducting disease-specific analyses with larger sample sizes could confirm this trend.

A French study also explored correlations between beliefs and medication adherence among patients with chronic diseases in general medical practices (15). Of the 265 patients included in the study, 40.8% had good medication adherence, 53.2% were "moderately adherent" and 6% were "non-adherent". In our study, only 11% of patients were "good adherent". This can be partially explained by a significant difference in the average number of medications taken by patients. In their study, patients had an average of 3.6±2.6 medications, almost three times less than in our study. One of the 6 questions of the GIRERD questionnaire related to the amount of medication to be taken: "Do you think you have too many pills to take" and 67% of our patients answered "yes". This may explain the low rate of "good adherent".

Deat *et al.* highlighted a significant correlation between the degree of adherence and the BMQ scores "concerns", "harmfulness" and "overuse", supporting the trend shown in our study. The absence of a statistical significancy could be explained by an important difference in the number of patients in each compliant group. Only ten patients were "non-adherent". Regarding the

concerns of "non-adherent" patients, our results are consistent with their study: patients were more concerned with their treatment, which may have an impact on medication adherence.

Fall *et al.* conducted a study among diabetic and HIV patients (10). A disease-specific analysis demonstrated significant correlations between medication adherence and the necessity and worry scales. Thus, negative beliefs were predictive of poor adherence. “Non-adherent” patients would therefore have a more negative overall view of medication than adherent patients.

According to the study by Huon *et al.* (16), the average number of medications taken by the elderly is 8 in the 70–80-year-olds, 9.61 in the 80–90-year-olds, 9.92 in the 90–100-year-olds and 8.11 for the over 100-year-olds. Overall, the increase in medication use varies as the population ages. Our patients, with an average age of 70.8 years, took an average of 9.7 medications. Unfortunately, the higher the number of medications, the higher the risk of forgetting or not taking the treatments (17). This high number of medications also has a role in patients' knowledge and beliefs. Our results demonstrated that the more medications patients took, the less they knew about their names and indications. These results are consistent with those reported in the literature (18).

One study showed that knowledge of drug indications varied based on the ATC class. Indeed, the drug classes where indications were not known included cardiovascular drugs (12%),

asthma drugs (5%) and estrogen therapies (5%) (19). In our study, we also noted that indications for cardiovascular drugs were the least known. This observation aligns with the fact that patients in the vascular medicine and surgery department have many cardiology medications. It is therefore essential that caregivers take sufficient time with patients to educate and involve them in their care. Persall *et al.* (19) also revealed that the older and less educated the patients were, the less they knew about their treatments. Our results support these findings.

Only 16% of patients could perfectly name their treatment and 36% knew all the indications. In general, the level of knowledge of patients about their treatment was low. However, comparing our results to existing literature is challenging due to disparities in the number of drugs per patient and the number of patients included. Akici *et al.* (20) showed, in a study including 1618 patients with an average of 3.3 drugs per patient, that only 10.9% of patients could correctly name their treatment. Given the average number of medications taken by the patients in our study, over 9, it seems normal that the number of patients who could cite their entire treatment is low in our results. The study by Haidar-Ahmad *et al.* including 351 patients, with a mean number of medications taken of 3.83, described that 80.74% of the medications were known by the patients (21). Persall *et al.,* included 616 patients in their study. Only 13.5% of patients did not know any of the indications. They also noted a significant lack of knowledge of their patients for cardiovascular medications (19).

Although patient knowledge levels and medication adherence were low, the importance they attached to their treatment was high. Patient ratings indicated that the majority of prescribed drug classes were considered important to them. Only four ATC classes scored below average. This outcome confirms the "necessity" score obtained in the BMQ questionnaire. A French study assessed drug-related representations in patients with multiple myeloma (22). The authors estimated the importance the patient placed on his or her medications. Antithrombotic drugs, unlike our study, were rated lower, whereas anticancer drugs scored highest. This significant difference between medications that are all part of the overall management of myeloma could be explained by the degree of information provided to patients. Indeed, while the direct link between anticancer drugs and myeloma can easily be made, the link between antithrombotic drugs and the fatal consequences of myeloma is less intuitive. Our work reports on patients with multiple and varied chronic pathologies, with a large number of prescribed medications. Despite this, few differences were observed between ATC classes and therefore chronic pathologies. For a majority of patients, all treatments carried equivalent importance. Indeed, even if the patients did not spontaneously cite their symptomatic treatments, they gave them a high importance. This is due to the perceived immediate effect of using these treatments. This finding is in alignment with another study (23) which demonstrated that patients exhibited greater familiarity with analgesics compared to cardiovascular drugs, as they could directly

sense their effects. Notably, in our study, patients were very familiar with the effects of their symptomatic medications but did not cite them directly. This individual perception of treatment efficacy has been described as a determining factor in patient adherence to medication (24). Moreover, if representations about treatments impact patient adherence, adherence is also determined by the relationship of trust with the physician. Several studies have shown that the relationship between the physician and the patient has a significant impact on the feeling of usefulness and efficacy of the treatment, but also on adherence (25). Research has indicated that patients exhibit improved medication adherence when they possess sufficient information and a clear understanding of the rationale behind their treatment (26). As described by Peh et al. in their study, various factors contribute to therapeutic adherence, include healthcare professionals. For them, medication adherence depends on patients' perceived needs and beliefs about medication, which are, in turn, influenced by the information and advice provided by the healthcare provider during the medical consultation (27). In our study, the majority of patients reported receiving information about their treatment, but one third felt that this was not sufficient.

In our study, we were interested in the link between beliefs and adherence. Nevertheless, therapeutic adherence represents a multifaceted behavior shaped by a multitude of factors; factors linked to the patient (age for example, beliefs), to the care team (information), to the

disease (asymptomatic or symptomatic), to the treatment (undesirable effects or not), and to social and economic factors (24,27). A better information would mean a more effective and safer treatment for the patient. Consequently, this perception aids in optimizing their medication-taking behavior over an extended period (24).

Assessing patients' beliefs would allow us to better target their priorities, and thus to develop adapted educational actions and tools. Indeed, understanding the mechanisms and potential evolution of the disease will make it easier for patients to assimilate the objectives of their treatments and will facilitate their therapeutic adherence (28).

Strengths and biases

To our knowledge, the representation and beliefs of chronic treatments have not been studied in a vascular medicine and surgery department, in patients with multiple medications and cardiac pathologies. This is a single-center study. It would be of interest to replicate this investigation across multiple centers to achieve outcomes that are both generalizable and transferable.

In our study, the BMQ was used for a combination of several diseases, whereas its French version has only been validated for diabetes and HIV (10). Thus, patients with several chronic

diseases may not have the same representations regarding the treatments for each disease. The scores given by patients on each of their treatments were used to estimate the level of importance given to each medication. Notably, a predominant observation was that for the majority of patients, all their prescribed medications were perceived as equally significant, potentially indicating an absence of prioritization.

Another limitation inherent in our study pertains to the exclusive utilization of a questionnaire to assess adherence, despite the availability of various adherence measurement methods (both direct and indirect). While the questionnaire presents a straightforward, swift, and cost-effective technique, its stand-alone use is less robust. Many authors recommend using at least two methods. In addition, the use of questionnaires tends to overestimate medication adherence (29) which may seem worrying in view of the already low adherence reported in our results. In the context of short-stay inpatients, it was not possible to use direct methods (drug measurements, biological marker measurements), or to use any other indirect method than the questionnaire. Moreover, this would have lengthened the interview time with the patients and thus made the procedure more cumbersome.

Concerning the evaluation of knowledge, the hospitalization of our population certainly had an impact on the real knowledge of the patients about their treatment. In discussion with the doctors, we reached this limit in our study. Being in a stressful environment, in a context of

acute pathology, could potentially have decreased their true knowledge of the names and indications of their treatment, inducing a bias.

One of the exclusion criteria for the study was cognitive impairment. This was assessed clinically but was not confirmed by a specific assessment test such as Mini Mental State Examination (MMSE). This would have again made the protocol and interviews more cumbersome.

Conclusion

The level of knowledge and medication adherence of patients with multiple chronic diseases in the vascular medicine and surgery department is low. Representations of the disease and of medication have an impact on patients' behaviour. They are determinants of adherence to medication. Identifying patients' beliefs about their chronic treatment allows caregivers to adapt information to patients' needs. Better information from healthcare professionals (physician, nurse, pharmacist, etc.) regarding the indication and efficacy of the prescribed treatment is essential. Combined with the consideration of patients' concerns, particularly regarding tolerance, this will improve the benefit/concern ratio perceived by these patients, and thus increase their compliance. The BMQ may help to identify patients at risk of poor compliance.

394

395

396

Acknowledgments

The authors would like to thank all the staff members of the vascular medicine and surgery department for their kind help in performing this study.

Contributors:

DK, JS, MB, SPL and JFH contributed to the study conception and design. Data collection and analysis were performed by CV and DK. The first draft of the manuscript was written by DK and JS, MB, AB, SPL, CV and JFH commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Competing interests

The Author(s) declare(s) that there is no conflict of interest.

Funding

No funding was obtained for this study.

Data sharing statement

The data underlying this article will be shared on reasonable request to the corresponding author.

Bibliography

1. Chassang M, Gautier A. Les maladies chroniques [online]. 2019. https://www.lecese.fr/sites/default/files/pdf/Avis/2019/2019_14_maladies_chroniques.pdf (accessed 21 Januar 2022).

2. WHO. Noncommunicable diseases [online]. https://www.who.int/fr/news-room/fact-sheets/detail/noncommunicable-diseases (accessed 21 October 2023).

3. Briançon S, Guérin G, Sandrin-Berthon B. Maladie chroniques [online]. 2010. 2010-09-adsp-n°72-maladies-chroniques-et-ETP.pdf. (accessed 21 Januar 2022)

4. Laroche JP, Guilbert B, Miserey G, et al. Conseil National Professionnel de Médecine Vasculaire, Médecine Vasculaire - Etat des lieux. [online]. 2015. https://www.portailvasculaire.fr/sites/default/files/docs/livre_blanc_2015.pdf (accessed 26 July 2022)

5. Monégat M, Sermet C, Perronnin M, et al. La polymedication definitions mesures et enjeux [online]. 2014. https://www.irdes.fr/recherche/questions-d-economie-de-la-sante/204-la-polymedication-definitions-mesures-et-enjeux.pdf (accessed 3 Januar 2022)

6. Le Cossec C. La polymédication au regard de différents indicateurs de sa mesure: impact sur la prévalence, les classes thérapeutiques concernées et les facteurs associés. [online]. 2015.

https://www.irdes.fr/recherche/rapports/562-la-polymedication-au-regard-de-differents-indicateurs-de-sa-mesure.pdf (accessed 3 Januar 2022)

7. Schneider MP, Herzig L, Hugentobler Hampai D, et al. Revue Medicale Suisse. Adhésion thérapeutique du patient chronique : des concepts à la prise en charge ambulatoire [online]. 2013. https://www.revmed.ch/revue-medicale-suisse/2013/revue-medicale-suisse-386/adhesion-therapeutique-du-patient-chronique-des-concepts-a-la-prise-en-charge-ambulatoire (accessed 3 Januar 2022)

8. Turrise S. Illness Representations, Treatment Beliefs, Medication Adherence, and 30-Day Hospital Readmission in Adults With Chronic Heart Failure: A Prospective Correlational Study. J Cardiovasc Nurs. 2016;31(3):245-54. doi: 10.1097/JCN.0000000000000249

9. Horne R, Weinman J, Hankins M. The beliefs about medicines questionnaire: The development and evaluation of a new method for assessing the cognitive representation of medication. Psychol Health. 1999;14(1):1-24. doi: 10.1080/08870449908407311

10. Masson E. EM-Consulte. Validation of the French version of the Beliefs about Medicines Questionnaire (BMQ) among diabetes and HIV patients [online]. 2014. https://www.em-consulte.com/article/934270/validation-of-the-french-version-of-the-beliefs-ab (accessed 3 Januar 2022)

11. Horne R, Weinman J. Patients' beliefs about prescribed medicines and their role in adherence to treatment in chronic physical illness. J Psychosom Res. 1999;47(6):555-67. doi: 10.1016/S0022-3999(99)00057-4

12. Charles C, Ninot G, Sultan S. Représentations des patients et observance des traitements par corticostéroïdes inhalés dans l'asthme. Revue systématique sur la période 1999–2009. Rev Mal Respir. 2011;28(5):626-35. doi: 10.1016/j.rmr.2010.11.003

13. Girerd X, Hanon O, Anagnostopoulos K, et al. Assessment of antihypertensive compliance using a self-administered questionnaire: development and use in a hypertension clinic. Presse Medicale Paris Fr 1983. 2001;30(21):1044-8.

14. Torrecillas S, Perrot E, Gérinière L, et al. Croyances des patients envers les thérapies ciblées orales et leur influence sur l'observance dans le cancer broncho-pulmonaire : une étude pilote prospective. Rev Pneumol Clin. 2016;72(1):25-34. doi: 10.1016/j.pneumo.2015.03.005

15. Déat et al. Croyances à propos des médicaments et observance chez les patients atteints de maladie chronique. Exerc Rev Francoph Médecine Générale. 28(138):436.

16. Huon JF, Lenain E, LeGuen J, et al. How Drug Use by French Elderly Patients Has Changed During the Last Decade. Drugs - Real World Outcomes. 2015;2(4):327-33. doi: 10.1007/s40801-015-0041-6

17. Bruyer B. Évaluation des connaissances que les patients ont de leurs traitements et du temps d'éducation thérapeutique en consultation de médecine générale ou en pharmacie. Médecine humaine et pathologie. 2020. ffdumas-03054136f

18. Chung MK, Bartfield JM. Knowledge of prescription medications among elderly emergency department patients. Ann Emerg Med. 2002;39(6):605-8. doi: 10.1067/mem.2002.122853

19. Persell SD, Heiman HL, Weingart SN, et al. Understanding of drug indications by ambulatory care patients. Am J Health Syst Pharm. 2004;61(23):2523-7. doi: 10.1093/ajhp/61.23.2523

20. Akici A, Kalaça S, Uğurlu MU, et al. Patient knowledge about drugs prescribed at primary healthcare facilities. Pharmacoepidemiol Drug Saf. 2004;13(12):871-6. doi: 10.1002/pds.1020

21. Haidar-Ahmad F. Les facteurs influençant la connaissance du traitement chronique : étude menée sur 351 patients dans les 14ème, 15ème et 16ème arrondissements de Marseille. Sciences du Vivant [q-bio]. 2019. ffdumas-02274110f

22. Huon JF, Fronteau C, Caffin AG, et al. Évaluation des représentations relatives aux médicaments chez les patients atteints de myélome multiple. Educ Thérapeutique Patient - Ther Patient Educ. EDP Sciences; 2017;9(1):10101. doi: 10.1051/tpe/2017002

23. Oudjhani M, Foison O, Astier A. Est-ce que les sujets âgés connaissent leurs traitements ? J Pharm Clin. 2012;31(2):113-6. doi: 10.1684/jpc.2012.0215

24. Johnson MJ. The Medication Adherence Model: a guide for assessing medication taking. Research and theory for nursing practice, 16(3), 179–192. 2002. https://doi.org/10.1891/rtnp.16.3.179.53008

25. Fuertes JN, Mislowack A, Bennett J, et al. The physician–patient working alliance. Patient Educ Couns. 2007;66(1):29-36. doi: 10.1016/j.pec.2006.09.013

26. Monnier G, Charpiat B, Serratrice F, et al. Evaluation de l'apport d'une consultation de pharmacie sur les connaissances des patients transplantés hépatiques. Therapies. 2003;58(4):305-11. doi: 10.2515/therapie:2003047

27. Peh, K.Q.E., Kwan, et al. An Adaptable Framework for Factors Contributing to Medication Adherence: Results from a Systematic Review of 102 Conceptual Frameworks. J GEN INTERN MED 36,

28. Kelly M, McCarthy S, Sahm LJ. Knowledge, attitudes and beliefs of patients and carers regarding medication adherence: a review of qualitative literature. Eur J Clin Pharmacol. 2014;70(12):1423-31. doi: 10.1007/s00228-014-1761-3

29. Allenet B, Baudrant M, Lehmann A, et al. Comment évaluer l'adhésion médicamenteuse ? Le point sur les méthodes. Ann Pharm Fr. 2013;71(2):135-41. doi: 10.1016/j.pharma.2012.10.001

Legends

Figure 1: Responses to the BMQ questionnaire (percentage of responses among the 100 patients)

Tables

Table 1. *BMQ score results - Beliefs*

BMQ* - Beliefs	**N = 100**	**Male N = 69**	**Female N = 31**	**p-value**
Specific Beliefs - Necessity	21.9±3.5 [8.0;25.0]	21.7±3.6	22.2±3.1	0,4822
Specific Beliefs - Concerns	11.1±4.8 [5.0;23.0]	10.5±4.4	12.5±5.5	0.0509
General Beliefs - Harm	9.1±3.2 [4.0;17.0]	8.6±3.0	10.1±3.5	**0.0352**
General Beliefs - Overuse	10.3±3.4 [4.0;17.0]	9.8±3.4	11.5±3.3	**0.0170**
BMQ Necessity - BMQ Concern > 0†	96 (96.0%)	66 (95.7%)	30 (96.0%)	1.0000

Results are presented as mean ± standard deviation [minimum-maximum] or frequencies and percentages

Specific belief scores range from 5 to 25 and general belief scores range from 4 to 20. A high score indicates a strong belief.

*BMQ: Belief Medical Questionnaire

†BMQ "necessity" - BMQ "concern" > 0 means that the beneficial character is superior to the worrying character.

Table 2. *Responses to the GIRERD questionnaire and correlations between compliance and beliefs (N=100)*

Questions and number of positive responses				**N (%)**
Did you forget to take your medication this morning?				1 (1.0%)
Since your last visit, have you run out of medication?				7 (7.0%)
Have you ever taken your medication late compared to the usual time?				43 (43.0%)
Have you ever not taken your medication because your memory fails you some days?				23 (23.0%)
Have you ever not taken your medication because some days you feel that your medication is doing you more harm than good?				9 (9.0%)
Do you think you have too many pills to take?				61 (61.0%)
	Good adherent N = 11 (11.0%)	**Low adherent** N = 79 (79.0%)	**Non-adherent** N = 10 (10.0%)	p-value
Specific Beliefs - Necessity	21.0 [6.0;12]	23.0 [21.0;25.0]	23.0 [16.0;24.0]	0.6487
Specific Beliefs - Concerns	9.0 [6.0;12.0]	11.0 [6.0;14.0]	17.0 [9.0;20.0]	0.1163
BMQ Necessity - BMQ Concern > 0†	11 (100.0%)	78 (98.7%)	7 (70.0%)	**0.0039**
General Beliefs - Harm	9.0 [6.0;12.0]	8.0 [6.0 ;11.0]	11.5[9.0 ;16.0]	0.0739
General Beliefs - Overconsumption	8.0 [5.0 ;12.0]	10.0 [8.0 ;13.0]	13.0 [9.0 ;16.0]	0.1086

The results are presented in median [1st Quartile; 3rd Quartile] for quantitative variables and in the form of frequencies (%) for qualitative variables

Specific belief scores range from 5 to 25 and general belief scores range from 4 to 20. A high score indicates a strong belief.

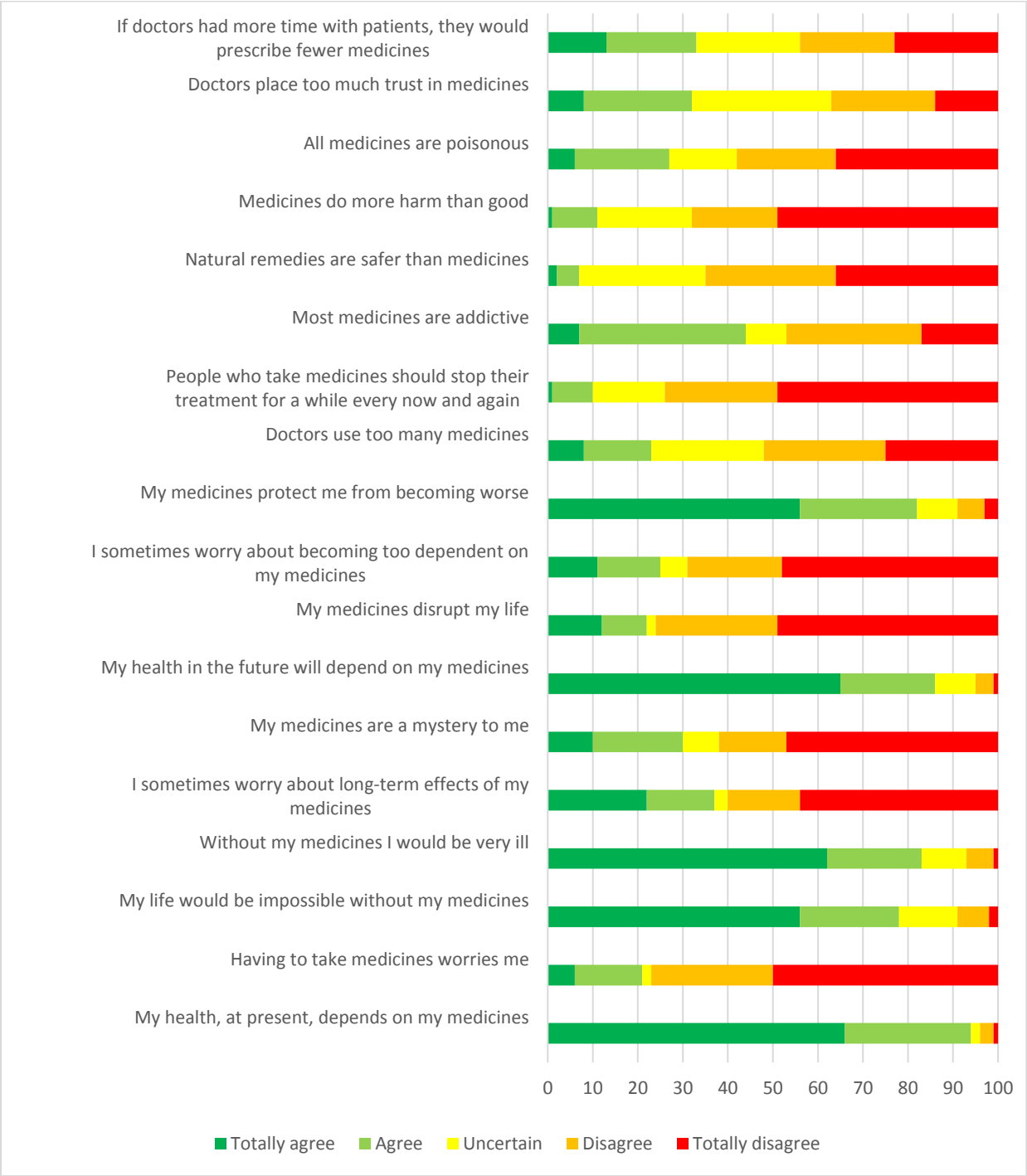
†BMQ "necessity" - BMQ "concern" > 0 means that the beneficial character is superior to the worrying character.

BMQ: Belief Medical Questionnaire

Table 3*. Correlation between adherence, beliefs and knowledge about their treatments for the 100 patients*

	Beliefs	**Drugs mentionned**		**Known indications**	
		r	p	r	p
Good adherent (N=11)	Specific Beliefs - Necessity	-0.22	0.5220	0.17	0.6185
	Specific Beliefs - Concerns	-0.01	0.9837	-0.11	0.7403
	General Beliefs - Harm	0.07	0.8488	0.15	0.6686
	General Beliefs - Overuse	0.37	0.2651	0.26	0.442
Low adherent (N=79)	Specific Beliefs - Necessity	0.01	0.9540	-0.07	0.5457
	Specific Beliefs - Concerns	-0.12	0.2994	-0.11	0.3491
	General Beliefs - Harm	-0.21	0.0689	-0.30	**0.0069**
	General Beliefs - Overuse	-0.23	**0.0401**	-0.21	0.0630
Non-adherent (N=10)	Specific Beliefs - Necessity	-0.35	0.3216	-0.43	0.2149
	Specific Beliefs - Concerns	0.41	0.2434	0.44	0.2064
	General Beliefs - Harm	0.21	0.5643	0.57	0.0858
	General Beliefs - Overuse	0.38	0.2726	0.47	0.1677

Figure 1: *Responses to the BMQ questionnaire (percentage of responses among the 100 patients)*



Supplemental Table :

Supplemental Table 1. *Characteristics of the population (N=100) and the drugs (N=965)*

Characteristics of patients	**N=100**
Female sex	31 (31.0%)
Age (years)	70.8 ± 10.7 [38.0;92.0]
Time since first chronic treatment (years)	19.4 ± 12.4 [0.5;58.0]
Level of study	
Secondary level	45 (45.0%)
Higher study	24 (24.0%)
Primary level	24 (24.0%)
Lack of study	7 (7.0%)
Socio-professional category	
Workers	31 (31.0%)
Intermediate professions	18 (18.0%)
Employees	17 (17.0%)
Executives, Higher intellectual professions	14 (14.0%)
Craftsmen, Shopkeeper, Compagny managers	12 (12.0%)
Farmer	5 (5.0%)
Other†	3 (3.0%)
Lifestyle	
Circled	91 (91.0%)
Alone	9 (9.0%)
Organization around medication intake	
Autonomous	83 (83.0%)
Help from relatives (partner, children)	11 (11.0%)
Assistance from a nurse	6 (6.0%)
Information received at the start of treatment	87 (87.0%)
Source of information	
From the general practitioner	73 (73.0%)
From the specialist doctor	61 (61.0%)
From the pharmacist	46 (46.0%)
From family and friends	5 (5.0%)
Information received perceived as sufficient by the patient	64 (64.0%)
Need for additional research (Internet, books, magazines, leaflets)	27 (27.0%)

Drug Characteristics	**N=965**
Number of drugs per patient	9.7 ± 3.6 [5;21]
ATC class of drugs	
Cardiovascular (C)	310 (32.0%)
Alimentary tract and metabolism (A)	190 (19.8%)
Nervous System (N)	175 (18.0%)
Blood and blood-forming organs (B)	141 (14.6%)
Respiratory system(R)	47 (4.9%)
Systemic hormones, excluding sex hormones (H)	19 (2.0%)
Other‡	83 (8.7%)

Results are presented as mean ± standard deviation [minimum-maximum] for quantitative variables and as counts (%) for qualitative variables

*To the question "Since when have you been taking your first chronic treatment?", 4 patients were unable to answer.

†Other occupations: Housewife (2%), No occupation (1%)

‡Other ATC class: J-General anti-infectives for systemic use (0.8%), L-Antineoplastics and immunomodulators (1. 6%), P-Antiparasitic, insecticides (0.1%), V-Miscellaneous (0.6%), D-Dermatological drugs (0.5%), M-Muscle and skeletal (1.4%), S-Sensory organs (1%), G-Genitourinary system and sex hormones (1.7%), No ATC class (1%)

Supplemental Table 2. *Correlation between different age categories and patients' knowledge (drugs and indications cited) (N = 100)*

	Age (years)	**[30-59] N=10**	**[60-69] N=28**	**[70-79] N=46**	**[80 and more] N=16**	**p-value**
Percentage of drugs cited	Median	83.3	46.4	40.0	28.6	
	[Q1;Q3]	[66.7;100.0]	[29.7;74.3]	[18.2;71.4]	[0.0;66.4]	**0.0193**
	[Min-Max]	[20.0 ;100.0]	[0.0;100.0]	[0.0;100.0]	[0.0;100.0]	
Percentage of known indications	Median	100.0	75	80.9	84.5	
	[Q1;Q3]	[82.4;100.0]	[55.2;90.5]	[54.5;100.0]	[39.4;100.0]	0.0761
	[Min-Max]	[60.0;100.0]	[23.1;100.0]	[0.0;100.0]	[0.0;100.0]	

Q1 : First Quartile ; Q3 : Third quartile ; Min : minimum ; Max : maximum

Supplemental Files 1 : Global questionnaire

Patient n°: ……..
Length of the interview: ……

Socio-demographic information :

Gender: Age: Lifestyle: ☐ Married ☐ Single ☐ Children

Origins:

Level of study:

Socio-professional category: ☐ Farmer ☐ Craftsmen, Shopkeeper, Compagny managers

☐ Executives, Higher intellectual professions ☐ Professions intermédiaires

☐ Employees ☐ Workers Other:……

Chronic treatment :

Number of medications on the prescription:

How long have you been taking your first chronic treatment?

Informations :

- Have you ever had your treatments explained to you? Yes ☐ No ☐
- Do you feel you have received enough information about your treatments? Yes ☐ No ☐
- From whom did you get information about your treatments?
    - Specialist
    - General practitioner
    - Pharmacist
    - Family

Treatment management :

- Who manages your treatments?
    - Myself
    - A nurse
    - A family member

Knowledge of my chronic treatment :

- *If the patient forgets treatments, the caregiver will quote the medication.*
- *A score between 0 and 10 should be given by the patient to estimate the importance he/she gives to his/her treatment. (0: not at all important, 10: Essential)*

My medications	Cited	Indication	Importance

Do you have any difficulties with your treatments?

……

……

……

Number of known medications :

Supplemental Files 2 : Belief Medical Questionnaire

Patient n°:

Score:

1: Totally disagree, 2: Disagree, 3: Uncertain, 4: Agree, 5: Totally agree

Specific Beliefs :

1. My health, at present, depends on my medicines:
2. Having to take medicines worries me:
3. My life would be impossible without my medicines:
4. Without my medicines I would be very ill:
5. I sometimes worry about long-term effects of my medicines:
6. My medicines are a mystery to me:
7. My health in the future will depend on my medicines:
8. My medicines disrupt my life:
9. I sometimes worry about becoming too dependent on my medicines:
10. My medicines protect me from becoming worse:

General Beliefs :

11. Doctors use too many medicines:
12. People who take medicines should stop their treatment for a while every now and again:
13. Most medicines are addictive:
14. Natural remedies are safer than medicines:
15. Medicines do more harm than good:
16. All medicines are poisonous:
17. Doctors place too much trust in medicines:
18. If doctors had more time with patients, they would prescribe fewer medicines:

Supplemental Files 3 : GIRERD questionnaire

Assessment of medication compliance

Patient n° :

	YES	NO
Did you forget to take your medication this morning?		
Since your last visit, have you run out of medication?		
Have you ever been late taking your medication?		
Have you ever not taken your medication because your memory fails you some days?		
Have you ever not taken your medication, because some days you feel that your treatment is doing you more harm than good?		
Do you think you have too many pills to take?		

Supplemental Files 4 : The local ethics committee

AVIS 22-06-2201
Groupe Nantais d'Ethique dans le Domaine de la Santé (GNEDS)

Nom du protocole Code et versioning	**Croyances et représentations chez les patients polymédiqués en chirurgie et médecine vasculaire**

Investigateur principal	Dr JF HUON
Lieu de l'étude	CHU NANTES
Type de l'étude	Monocentrique, prospective, exploratoire, observationnelle
Type patients/participants	Patients polymédiqués hospitalisés en chirurgie et médecine vasculaire
Nombre de patients/participants prévus	100
Objectif principal	Evaluation de la croyance des patients sur leurs traitements habituels
Objectif secondaire	Connaissance et importance données par le patient à chacun de ses traitements Adhésion médicamenteuse

Documents communiqués

Justification de l'étude	OUI
Méthodologie	OUI
Lettre d'information et lettre de consentement	OUI

Remarque générale
Le GNEDS formule d'abord la remarque qu'il n'a pas pour mission de donner un avis sur les aspects scientifiques du protocole, en particulier sur l'adéquation de la méthodologie aux objectifs poursuivis par l'étude. Il ne tient compte des données d'ordre scientifique et méthodologique que dans la mesure où elles ont des implications d'ordre éthique. Dans le cas présent, il se bornera à constater que les objectifs de cette étude et sa méthodologie sont conformes aux principes de l'éthique.

Confidentialité

Confidentialité	OUI
Anonymat	OUI
CNIL	RGPD

Commentaires :

Information et consentement

Consentement :

Recueil nécessaire	OUI
Type consentement préférable	ORAL
Traçabilité dans le dossier	NA

Commentaires :

Lettre information précisant :

Titre de l'étude	OUI
But de l'étude	OUI
Déroulement de l'étude	OUI
Prise en charge courante inchangée	OUI
Possibilité de recevoir résultats de l'étude	OUI
Traçabilité dans le dossier	NA

Commentaires :

Conclusion

Avis favorable	OUI
Révision nécessaire selon commentaires	
Avis défavorable	

GNEDS : Professeur Paul BARRIERE

Nantes le 22 juin 2022

Reporting checklist for cross sectional study.

An observational and prospective study: Evaluation of beliefs and representations of chronic treatments of polymedicated patients hospitalized in a vascular medicine and surgery department

D. Kotry *et al.*

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the STROBE cross sectionalreporting guidelines, and cite them as:

von Elm E, Altman DG, Egger M, Pocock SJ, Gotzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies.

Reporting Item	Page Number

Title and abstract			
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	2-3
Introduction			
Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	#3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	#4	Present key elements of study design early in the paper	5
Setting	#5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of selection of participants.	5
	#7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement).	5-6

		Describe comparability of assessment methods if there is more than one group. Give information separately for for exposed and unexposed groups if applicable.	
Bias	#9	Describe any efforts to address potential sources of bias	NA
Study size	#10	Explain how the study size was arrived at	5
Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	6
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	6
Statistical methods	#12b	Describe any methods used to examine subgroups and interactions	NA
Statistical methods	#12c	Explain how missing data were addressed	NA
Statistical methods	#12d	If applicable, describe analytical methods taking account of sampling strategy	NA
Statistical methods	#12e	Describe any sensitivity analyses	NA
Results			
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility,	7

		confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	
Participants	#13b	Give reasons for non-participation at each stage	NA
Participants	#13c	Consider use of a flow diagram	NA
Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	7
Descriptive data	#14b	Indicate number of participants with missing data for each variable of interest	Supplemental Table 1
Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	7-10 + tables
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7-10 + tables
Main results	#16b	Report category boundaries when continuous variables were categorized	NA

Main results	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	#18	Summarise key results with reference to study objectives	10
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	15
Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	10-16
Generalisability	#21	Discuss the generalisability (external validity) of the study results	14
Other Information			
Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17