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Association between healthcare practitioners' beliefs about statins and patients' beliefs and adherence

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Aims: Adherence to statins ranges from 32% to 79%. Patients' beliefs about medication are associated with adherence. There is lack of insight into the possible association between beliefs of healthcare practitioners (HCPs) about statins and patients' beliefs and adherence. This study aims to examine whether HCPs' beliefs about statins are associated with patients' beliefs and adherence about/to statins.
Methods: Cross-sectional study in 48 pharmacies and affiliated physicians' practices between 3 September 2014 and 20 March 2015. HCPs' (prescribers and pharmacy staff) and patients' beliefs about statins were assessed with the Beliefs about Medicine Questionnaire (BMQ) specific. Adherence to statins was assessed with the MARS-5 questionnaire. Multilevel regression analysis was performed to assess the association between HCPs' beliefs and patients' beliefs and adherence.
Results: 1504 patients (mean age 66.8 [s.d. ± 9.9] years, 46.5% female) and 734 HCPs (209 physicians, 118 pharmacists and 366 pharmacy technicians) participated in this study. Patients have higher BMQ necessity (16.9 [s.d. ± 4.3]) and BMQ concern (12.3 [s.d. ± 3.9]) scores than HCPs (15.0 [s.d. ± 3.0] and 11.5 [s.d. ± 2.9], $P < 0.001$). No associations were found between any of the HCPs' BMQ and patients' BMQ scores and adherence to statins. Patients' BMQ necessity, concern and necessity-concerns (NC)-

differential scores were associated with patients' adherence (MARS-5) scores. B (95% CI) coefficients were 0.057 (0.035-0.079), −0.040 (−0.064 to –0.016) and.061 (0.043-0.079). **Conclusions:** Patients have stronger beliefs about medication compared to HCPs. No associations were found between HCPs' BMQ scores on the one hand and patients' BMQ scores and adherence to statins on the other hand.

1. Introduction

Statins are a proven therapy to lower serum concentrations of lowdensity lipoprotein cholesterol, reducing the risk of ischaemic heart disease events by about 60% and stroke by 17%.[1] Despite this, medication adherence, which is defined as the extent to which the patient's behaviour in terms of actually taking medication corresponds with agreed recommendations from the healthcare practitioner,[2] varies between 32% and 79% for statins.[3–9]

Nonadherence to statins has a negative impact on treatment outcomes. Patients with poor adherence to statins are more likely to be admitted to the hospital due to cardiovascular heart disease, have a greater potential of having cardiovascular events and cause avoidable high healthcare costs.[7,10–13]

Consequently, interventions to increase medication adherence to statin therapy are warranted to improve health outcomes. Adherence is, according to the WHO, a multidimensional phenomenon in which five dimensions are interrelated: “health-system/HCT factors”,“social/economic factors”, “condition-related factors”, “therapy-related factors” and “patient-related factors”.[14] Research into the effectiveness of interventions to improve adherence to statins often focuses on the dimension “patient-related factors”. So far, these studies show conflicting results (effect on adherence ranging from −3% up to 25%).[15–19] Furthermore, most published studies focus on practical barriers like simplifying the dosing schedules and providing reminders. However, besides practical barriers, nonadherence can also be the result of perceptual barriers entailing that patients decide not to follow the prescribed dosing regimen based on their beliefs about medication. Patients with perceptual barriers seem to weigh their beliefs about the necessity of medication and concerns about the potential adverse effects of medication.[13,20] These beliefs of patients have a direct association with adherence for a wide range of medicines for chronic conditions[13] and are also modifiable, as demonstrated by Clifford et al.[21]

As previously mentioned, research on interventions to improve adherence to statins mainly focuses on the dimension “patient-related factors” and interventions that target the relevant factors in the healthcare environment are urgently required.[14] Not only patients, but also HCPs have beliefs about the necessity and concerns of medication.[22–25] We hypothesize that HCPs' beliefs influence patients' beliefs. Previous research has shown that the beliefs of the physician about a particular treatment may influence the patient's choice to undergo and the patient's adherence to that treatment.[24–27] HCPs' beliefs about statins are therefore an interesting target for interventions to improve the adherence of patients. Furthermore, influencing the beliefs of one healthcare provider may affect the beliefs and adherence of several patients. Currently no evidence is available about HCPs' necessity beliefs and concerns about cholesterol-lowering medication. Furthermore, it is unknown whether these beliefs might affect patients' beliefs about medication and their adherence to cholesterol-lowering medication.

This study therefore aims to assess HCPs' (physicians, pharmacists and pharmacy technicians) and patients' beliefs about statins and whether the HCPs' beliefs are associated with the patients' medication beliefs and adherence to statins. In addition, the possible association between patients' beliefs about cholesterol-lowering medication and patients' adherence to statins is assessed.

2. Methods

2.1 Study design and setting

This cross-sectional study was conducted between 3 September 2014 and 20 March 2015.

What is known about this subject

- Previous research shows that adherence to statin therapy varies between 32% and 79%.
- A direct association with adherence has already been found for patients' beliefs on both necessity and concerns about medication.
- Previous research has shown that the beliefs of the physician about a particular treatment may influence the patient's choice to undergo that treatment.

What this study adds

- There is currently no information available about HCPs' (physicians, pharmacists and pharmacy technicians) beliefs about cholesterol-lowering medication and it is unknown whether these beliefs are associated with patients' beliefs about medication and their adherence to cholesterol-lowering medication.
- All domains of the patients' BMQ (necessity, concerns and NC-diff) were associated with patients' adherence to statins based on the MARS-5.
- Patients have stronger beliefs about medication compared to HCPs and no associations were found between HCPs' BMQ scores on the one hand and patients' BMQ scores and adherence to statins on the other.

The participating pharmacists from 48 Dutch pharmacies (44 community and 4 outpatient) were all enrolled in the postgraduate education program for becoming a specialized community pharmacist and participated in the study as part of their curriculum.[28] All pharmacists approached 10 pharmacy technicians from their pharmacy (if available), all other pharmacists employed in their pharmacy and the top five of the most frequent prescribers of statins (physicians and/or nurse practitioners) of patients visiting their pharmacy to participate in this study. As this study did not fall under the scope of the Dutch Medical Research Involving Human Subjects Act, ethical approval was not required.

2.2 Patient inclusion and measurements

2.2.1 Inclusion

From the start of data collection, all patients who visited the pharmacy with a statin prescription from one of the included prescribers were invited to participate in the study, up to a maximum of 50 patients per participating pharmacy. Patients were included after obtaining verbal informed consent. There were no exclusion criteria.

2.2.2.Variables and data collection

Patient variables were collected with a questionnaire assessing sociodemographic characteristics, medication-related information (duration statin use, prescriber) and a patient's beliefs about medication. Beliefs about statins were assessed with the Beliefs about Medicine Questionnaire (BMQ) specific[29] and patients' adherence to statins was assessed with the Medication Adherence Rating Scale-5 (MARS-5).[30] Patients were asked by the dispensing pharmacy technician to fill out the questionnaire in the pharmacy or to return the questionnaire by post. HCPs' socio-demographic characteristics and HCPs' beliefs about statins were assessed using the BMQ specific adapted for HCPs using a hardcopy questionnaire.[26]

2.2.3 Measurement instruments

Beliefs about Medicines Questionnaire specific

The BMQ consists of 10 items, with five items for beliefs about necessity and five items about concerns. Items are rated on a five-point Likert Scale (from 1 (strongly disagree) to 5 (strongly agree)), resulting in sum scale scores of 5 to 25 for the necessity and concern beliefs subscales. Whereas patients filled in the original BMQ specific, for HCPs the BMQ specific was adapted to the perspective of HCPs (eg, "I am worried about the fact that my patients have to take these medicines", "Without these medicines my patients would be very ill").[26,29]

Self-reported adherence

The MARS-5 consists of five items, mainly addressing intentional nonadherence behaviour (four out of five items). The items are rated on a five-point Likert scale (from 1 (always) to 5 (never)), resulting in a summated score of 5-[25.30]

2.3 Sample size and data analyses

Data were analysed using STATA version 13. Descriptive statistics were provided using mean (±s.d.) or median (p25-p75) values depending on the (non)parametric distribution of measured variables. P values ≤0.05 were considered statistically significant.

To calculate the sample size, the common rule of thumb was used in which the sample size requirements are based on events per variable, with a minimum of 10-20 events per variable. Assuming a sample size requirement of 20 nonadherent patients per variable and a prevalence of 20% of nonadherence, a sample of 1000 patients is sufficient to build a reliable model including a maximum of 10 independent variables. Taking into account a 15% loss to follow-up, a sample size of 1150 patients was required. Because of the explorative (rather than hypothesis-testing) character of this study, no multiple testing corrections were performed over the separate correlational analyses.

To assess if hierarchical data structure (patients clustered within physician and physicians within pharmacy) influenced our outcomes, multilevel regression analysis was conducted with the levels pharmacyand prescriber (physician or nurse practitioner). As pharmacists and pharmacy technicians jointly provide pharmacotherapeutic care for patients, these HCPs have been combined in the pharmacy level. Multilevel regression analyses were performed on the association between beliefs of HCPs and beliefs of patients, the association between the beliefs of HCPs and the adherence of patients and the association between beliefs of patients and adherence of patients, respectively. If one or more items within a domain (necessity, concerns or adherence) were not answered by a patient or a healthcare practitioner, the respondent was treated as missing for that specific domain.

3. Results

3.1 Response rate

In total, 2229 patients visited the HCPs and were asked to participate in the study, of whom 1504 (67.5%) agreed to participate and were included in this study (Table 1). The most common reasons for patients not to participate in the study were "not in the mood", "lack of time" and "already having responded previously to other questionnaires".

Further, a total 734 HCPs were asked to participate in the study of whom 693 (94.4%) agreed to participate and were included in this study. Response rates of the various HCPs were 209 out of 225 (92.8%) physicians, 118 out of 119 (99.1%) pharmacists and 366 out of 390 (94.1%) pharmacy technicians.

3.2. Patients' and HCPs' beliefs about statins

The scores concerning both patients' and HCPs' beliefs about statins are depicted in Table 2. The number of missings was less than 5%. Patients have higher BMQ necessity and BMQ concern scores compared to HCPs ($P < .0001$ for necessity and $P < .01$ for concerns). Among the HCPs, pharmacists have the highest BMQ necessity scores, followed by pharmacy technicians and physicians. Pharmacy technicians have the highest BMQ concern scores, followed by physicians and pharmacists. Pharmacists have a higher differential score than patients and other HCPs.

3.3 Association between HCPs' and patients' beliefs about statins

No associations were found between HCPs' (neither necessity scores, nor concerns and NC-differential) beliefs about statins and patients' beliefs about statins (Table 3).

[Table 1]

3.4 Patients' adherence to statins

The score (median (p25-p75)) concerning patients' adherence to statins as measured with the MARS-5 score was 25 (24-25). The proportions of patients with MARS-5 scores of ≥23 and ≥24 were 1349/1483 (91%) and 1215/1483 (82%), respectively.

3.5 Association between patients' beliefs about and adherence to statins

All domains of the patients' BMQ (necessity, concerns and NC-diff) were associated with patients' adherence to statins based on the MARS-5 (Table 4).

3.6 Association between HCPs' beliefs about and patients' adherence to statins

No associations were found between the HCPs' beliefs about statins and patients' adherence to statins (Table 4).

[Table 2] [Table 3] [Table 4]

4. Discussion

To our knowledge, this is the first study examining the association between the beliefs about statins on the part of HCPs and the patients' beliefs about statins and their adherence to statins. Patients have higher scores on necessity and concerns than healthcare practitioners. Among the HCPs, pharmacists have the highest scores on necessity, followed by pharmacy technicians and physicians, whereas pharmacy technicians have the highest scores on concerns, followed by physicians and pharmacists. Although patients have higher scores on necessity than pharmacists, pharmacists have a higher differential score due to very low concern scores compared to the patients' other HCPs. Patients' BMQ necessity, concern and NC-differential scores were associated with patients' adherence (MARS-5) scores. However, no association between the beliefs of HCPs and beliefs of patients and adherence of patients was found.

Despite the fact that treatment adherence seems to be high in the included population in this study (median MARS score 25), the adherence (MARS-5) scores of patients using statins in this study were similar to those in another study.[31] Furthermore, still 18% of patients are nonadherent to therapy, which is similar to the degree of nonadherence in other studies among patients taking statins in the Netherlands.[32,33] The results of this study furthermore show that patients have higher scores on necessity and concerns than healthcare practitioners. Although Driesenaar et al also found higher concern scores in patients compared to HCPs, they found a lower score on necessity in patients than in HCPs.[34] This may be explained by the fact that our study was conducted among patients using statins and Driesenaar's study concerned patients using inhaled corticosteroids.

Although the effect of statins and inhaled corticosteroids is not directly noticeable by the patient, the negative effect of nonadherence to inhaled corticosteroids is more directly noticeable for the patient compared to nonadherence to statins.

There are several possible explanations for the fact that no association was found between HCPs' beliefs about medication and patients' beliefs about medication and patients' adherence. First, it could be that HCPs know how to empathize with a patient and thereby eliminate their own beliefs about medication, resulting in not discussing their own beliefs with patients.[34,35] A second explanation may be that ceiling effects occur when using the MARS-questionnaire due to the lack of sensitivity to detect a difference in adherence, as described in the strengths and limitations section. A third explanation may be that besides perceptual barriers (which may result in intentional nonadherence), practical barriers (which may result in unintentional nonadherence) also play a role in patients' adherence behaviour, while beliefs about medicines questionnaire are mainly about intentional nonadherence, whereas the MARS-5 questionnaire is also about unintentional nonadherence. [36,37] A fourth explanation is that HCPs do not eliminate their own beliefs about medication, but they insufficiently or ineffectively communicate with patients about their beliefs. Effective communication about beliefs about medication and adherence consists of various elements. Effective communication about beliefs about medication and adherence starts with facilitating and being aware of the patient's knowledge about medication. Several studies describe the importance of this knowledge for medication adherence. [32,38] To improve adherence, misconceptions about illness and treatment should be avoided by exploring, understanding and engaging with a patient's knowledge and ideas about causality, experiences of symptoms and concerns about treatment.[39–41]

Another part of effective communication is creating a setting in which patients feel safe to raise their beliefs about medication and to speak out about medication nonadherence, so that nonadherence will not remain a hidden problem.[38,42] Finally, patients should be encouraged to raise issues concerning beliefs about medication and nonadherence in patient-HCP interactions. This can be achieved by communication tailored to the patient's illness- and treatment-related needs, experiences and circumstances.[14,43] During this patient-HCP communication, patients can be elicited to share their concerns and adherence behaviour, for instance by asking specific questions during or in preparation for their visit to the HCP.[42]

One of the strengths of this study was the large sample of patients and HCPs, as well as the high response, increasing the accuracy of the results. This study was furthermore conducted in a large number of practices across the Netherlands, which increases generalizability. Nevertheless, there are some limitations to this study. First, adherence was only measured by self-report questionnaires in this study. Self-report questionnaires are subjective and therefore sensitive to social desirability bias. Therefore, preferably a combination of methods to measure adherence (eg, self-report questionnaires, pill count, refill adherence, medication event monitoring systems and/or biochemical testing) should be used.[14] Furthermore, by examining an association between beliefs about medication and adherence, both measured by self-report questionnaires, it must be taken into account that the MARS questionnaire contains questions about cognitions like beliefs as well. This may result in a false-positive association between beliefs and adherence. However, no association between HCPs' beliefs about medication and patient's adherence was found, so it is not likely that this affects the outcome of this study at this point. Also, inclusion bias may have played a role in this study, as it is likely that adherent patients are more motivated to participate in this kind of study, which is confirmed by the fact that adherence rates were even higher in this study than in other studies with patients using statins.[8,9] If, as a result, there is not enough contrast in the included population (due to a small number of nonadherent patients), the MARS-5 may not be sensitive enough to detect a difference. Despite this, an association between the patients' BMQ scores and MARS-5 scores was found. This may explain the fact that no association was found between HCPs' beliefs and patients' adherence because the correlation with HCPs' beliefs is more difficult to prove.

The total number of participating patients was large, over 1400, so this reduces the chance that inclusion bias affected the results.

5. Conclusion

This study shows that patients' beliefs about statins are associated with patients' adherence to statins, so for statins patients' beliefs are a potential target to improve adherence. In addition, patients using statins have higher scores on necessity and concerns than HCPs prescribing or dispensing statins. No association was found between the BMQ scores of healthcare practitioners and the BMQ scores of patients and adherence of patients based on MARS-5. As only questionnaires were used in this study to examine these associations, further research on this association in which questionnaires on beliefs and adherence are combined with other methods to measure adherence (eg, MEMS devices, pill count, refill adherence etc) is recommended. The further research could be supplemented with examining to which extent communication about beliefs about medication and adherence behaviour during patient-HCP interactions takes place, by observing or audiotaping these interactions.

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Competing interests

There are no competing interests to declare.

Contributors

V.H. and B.vdB. had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. V.H. and B.vdB.: study concept and design. V.H. and B.vdB.: acquisition of data. V.H., C.vdE., L.vD., D.B. and B.vdB.: statistical analysis and interpretation of data. V.H., C.vdE., L.vD., D.B. and B. vdB.: drafting of the manuscript. V.H., C.vdE., L.vD., D.B. and B.vdB.: critical revision of the manuscript for important intellectual content. B.vdB.: study supervision. All authors read and approved the final version of this manuscript.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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[Tables]

Table 1 Baseline characteristics patients and HCPs

Parameter	Patient characteristics (n = 1504)
Age (years) (mean [SD])	66.8 (9.9)
Gender[a] (female) (n [%])	675 (46.5)
Years of statin use (median [p25 p75])	6 (3-10)
Physician characteristics[b] (n = 209)	
Gender (female)(n [%])	94 (45)
Age (years) (mean [s.d.])	49.5 (10.0)
Years employed (median [p25 p75])	19 (10-26)
Pharmacist characteristics (n = 118)	
Gender[a] (female) (n [%])	71 (60.2)
Age (years) (mean [s.d.])	36.9 (11.0)
Years employed (median [s.d.])	10.3 (10.0)
Pharmacy technician characteristics (n = 366)	
Gender[a] (female) (n [%])	353 (98.1)
Age (years) (mean [s.d.])	39.7 (11.4)
Years employed (median [s.d.])	16.2 (11.0)

[a]In this study, participants could score gender as "male" or "female".
[b]General practitioner 89.5%, general practitioner in training 1.0, cardiologist 2.9%, internist 1.9%, neurologist 0.5%, nurse practitioner 1.0%, practice assistant 2.9%, other 0.5%.

Table 2 Mean (s.d.) BMQ scores of patients and HCPs

	Patients (n = 1504) mean (s.d.)	HCPs (n = 693) mean (s.d.)	Physicians (n = 209) mean (s.d.)	Pharmacists (n = 118) mean (s.d.)	Pharmacy technicians (n = 366) mean (s.d.)
Necessity beliefs about medication	16.9 (4.3)	15.0 (3.0)	13.9 (2.7)	15.6 (2.9)	15.4 (3.0)
Concern beliefs about medication	12.3 (3.9)	11.5 (2.9)	11.5 (2.8)	9.3 (2.6)	12.3 (2.5)
Necessity-concerns differential	4.6 (5.2)	3.5 (4.1)	2.5 (4.3)	6.4 (3.8)	3.1 (3.6)

Table 3 Multilevel regression analysis for the association of HCPs' beliefs and patients' beliefs about medication, controlling for pharmacy level and physician level

	Patients' BMQ_N B (95% CI) coefficient	Patients' BMQ_C B (95% CI) coefficient	Patients' BMQ_D B (95% CI) coefficient
Beliefs physicians			
BMQ_N	−0.075 (0.181-0.031)		
BMQ_C		−0.007 (−0.100-0.086)	
BMQ_D			−0.022 (−0.111-0.067)
Beliefs pharmacists			
BMQ_N	0.133 (−0.016-0.281)		
BMQ_C		−0.042 (−0.191-0.108)	
BMQ_D			0.037 (−0.123-0.199)
Beliefs pharmacy technicians			
BMQ_N	−0.009 (−0.032-0.014)		
BMQ_C		0.005 (−0.014-0.024)	
BMQ_D			−0.011 (−0.036-0.014)

*$P < .0001$.
**$P < .001$.
***$P < .01$.
BMQ_N, BMQ necessity score; BMQ_C, BMQ concern score; BMQ_D, BMQ differential score.

Table 4 Multilevel regression analysis for the association of patients' or healthcare practitioners' beliefs about medication and patients' adherence to medication, controlling for pharmacy level and physician level

	Patients' MARS-5 adherence scores B (95% CI) coefficient
Beliefs patients	
BMQ_N	0.058 (0.036-0.080)*
BMQ_C	−0.041 (−0.065 to −0.017)***
BMQ_D	0.062 (0.043-0.080)*
Beliefs physicians	
BMQ_N	−0.004 (−0.048-0.040)
BMQ_C	0.028 (−0.014-0.070)
BMQ_D	−0.013 (−0.043-0.017)
Beliefs pharmacists	
BMQ_N	−0.019 (−0.110-0.073)
BMQ_C	−0.003 (−0.108-0.103)
BMQ_D	−0.011 (−0.086-0.064)
Beliefs pharmacy technicians	
BMQ_N	−0.011 (−0.023-0.001)
BMQ_C	−0.010 (−0.022-0.001)
BMQ_D	−0.009 (−0.020-0.001)

*$P < .0001$.
**$P < .001$.
***$P < .01$.
BMQ_N, BMQ necessity score; BMQ_C, BMQ concern score; BMQ_D, BMQ differential score.