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### Beliefs about inhaled corticosteroids

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## PHARMACOTHERAPY

**Beliefs about inhaled corticosteroids: Comparison of community pharmacists, pharmacy technicians and patients with asthma**Jeanine A. Drieseenaar, MSc<sup>1</sup>, Peter A. G. M. De Smet, PhD<sup>2,3</sup>, Rolf van Hulten, PhD<sup>4,5</sup>, Rob Horne, PhD<sup>6</sup>, Hanneke Zwikker, PhD<sup>1</sup>, Bart van den Bemt, PhD<sup>2,7</sup>, and Sandra van Dulmen, PhD<sup>1,8,9</sup>

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**Abstract**

**Objectives:** To compare pharmacists' and pharmacy technicians' perceptions of patients' beliefs regarding inhaled corticosteroids (ICS) with those of patients and to compare the ICS beliefs of pharmacists and technicians with those of patients with asthma. **Methods:** 1269 community pharmacies were approached to fill out an online questionnaire; 1952 patients were sent a questionnaire by post. Beliefs (i.e., necessity and concerns) regarding ICS were measured using (an adapted version of) the Beliefs about Medicines Questionnaire (BMQ-specific). Pharmacists and technicians were instructed to fill out the BMQ for themselves, and to fill it out in the way they thought most of their patients would complete it. **Results:** 136 pharmacists, 90 pharmacy technicians and 161 patients with asthma completed the questionnaire. Pharmacists and technicians thought patients had more concerns about ICS than patients themselves reported ( $p < 0.0001$ ). They also thought that patients had stronger beliefs in their personal need for ICS than patients reported ( $p < 0.01$ ). Pharmacists reported lower levels of concerns than patients ( $p < 0.05$ ) and both providers attributed a higher level of necessity to ICS than patients did ( $p < 0.0001$ ). **Conclusion:** Pharmacists and technicians overestimate the personal need for treatment as well as the concerns patients with asthma have regarding ICS. They also have, to some extent, stronger positive beliefs about ICS than patients. If pharmacists and technicians expect that patients share their positive views about ICS, they might be less likely to elicit and address patients' doubts and concerns about ICS, which might be relevant for effective ICS treatment and subsequent patient outcomes.

**Keywords**

Beliefs about medicines, perceptions of patients' beliefs, patient-pharmacist communication, adherence, patient-centered communication

**History**

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**Introduction**

Worldwide, an estimated 334 million people are affected by asthma [1]. Patients' self-management skills, such as acquiring knowledge about asthma, self-monitoring of symptoms, psychological coping and adhering to medication recommendations, are important in asthma treatment [2]. Despite the importance of using inhaled corticosteroids (ICS) regularly and of continuously controlling asthma symptoms, about 40% of patients fail to take ICS as prescribed by their healthcare provider [3,4]. This suboptimal adherence is associated with reduced quality of life, poor asthma outcomes, morbidity, mortality, and high healthcare use and costs [3,5–7]. Therefore, suboptimal ICS adherence is a significant problem and it is important to find out how to improve adherence, which is essential for effective self-management and positive patient outcomes.

Suboptimal adherence is related to beliefs about medicines, and, in particular to how patients judge their personal need for treatment (necessity beliefs) compared to their concerns about potential negative effects. Addressing these beliefs could therefore contribute to better adherence [8–11]. Horne and colleagues distinguish between general and specific medication beliefs [12]. General medication beliefs include patients' thoughts about the harmfulness of medicines, overprescribing by doctors, and benefits of medication *in general*. Specific medication beliefs refer to perceptions of personal need for the treatment (necessity beliefs) and concerns regarding medicines for a *particular disease*. Studies indicate that about 30–43% of patients with asthma have concerns about ICS, relating to side effects, fear of long-term adverse effects and drug dependency [8,11]. One study found a smaller number of patients with high concern rates than other studies have reported (23%), but showed that more than one third of the patients doubted the necessity of ICS [13].

To facilitate informed choice, optimal adherence to appropriately prescribed treatment, and self-management, healthcare

providers should take patients' medication beliefs into account. In their interactions with patients, they can accomplish this by being alert, empathic and responsive to patients' concerns, feelings, and ideas regarding their medication use. Such a patient-centered approach, 'in which the patient's point of view is actively sought' [14], is considered to enhance patient satisfaction, medication adherence, and health outcomes, although literature studies yield inconsistent findings [15,16].

The level to which healthcare providers communicate in a patient-centered way and are able to achieve concordance—i.e., a shared responsibility by providers and patients in treatment and therapeutic decisions, whereby patients' beliefs and preferences are taken into account [8,17]—might be reflected in an accurate perception of patients' medication beliefs. Such perceptions are built during providers' interactions with patients. In turn, if healthcare providers' perceptions of patients' medication beliefs correspond with patients' actual beliefs, this might enhance their responsiveness (i.e., being attentive and sensitive) to patients' concerns and doubts about the need for ICS. No previous research has examined providers' perceptions of patients' beliefs. Therefore, it is interesting to get insight into providers' perceptions of patients' beliefs and to compare these with patients' actual beliefs.

Additionally, healthcare providers' *own* beliefs are likely to influence the degree of patient-centered communication and the concordance that can be achieved. If providers and patients hold the same medication beliefs, the providers might be expected to be more responsive to their patients' doubts and concerns about ICS and elicit them. However, if providers have a more positive view of ICS than patients, they might be more inclined to assume that patients have similar beliefs, and therefore fail to extensively explore patients' thoughts. Few studies have examined these issues but there is some evidence that healthcare providers have more positive views about medicines in general than patients do [18,19]. In addition, Rämstrom and colleagues showed that pharmacists have more positive medication beliefs than patients do, and therefore they emphasized that it is important that pharmacists elicit patients' views, experiences and concerns; pharmacists must not assume that patients are as positive about medication as they are themselves [20].

In this study we concentrate on specific medication beliefs, in particular perceptions of the necessity of ICS and concerns, as held by patients with asthma, community pharmacists, and pharmacy technicians. Regarding adherence to ICS, specific medication beliefs are likely to be most salient, in particular perceptions of the necessity of ICS and concerns [10]. We focus on the setting of the community pharmacy because patient counseling has become a pivotal task of community pharmacists [21].

To gain more insight into differences in ICS beliefs between patients with asthma and providers, the objectives of this study are: 1) to compare pharmacists' and pharmacy technicians' perceptions of patients' ICS beliefs with the ICS beliefs of the patients themselves, and 2) to compare the ICS beliefs of patients with asthma with the beliefs of pharmacists and pharmacy technicians. Pharmacists' and pharmacy technicians' beliefs will be examined separately as several studies found differences in their communication and beliefs [19,22,23].

## Methods

### Setting

This cross-sectional study is part of a larger research project investigating the communication of community pharmacists and pharmacy technicians with patients with asthma and/or Chronic Obstructive Pulmonary Disease (COPD) about their ICS use.

Data for this study were obtained in two different ways. Patients' data were obtained in 12 community pharmacies between September 2011 and February 2012; the methods used are described in the "Patient part." Pharmacists' and pharmacy technicians' data were obtained between January 2014 and March 2014; the methods for this are described in the "Pharmacy part."

### Ethics

The research proposal was assessed by the Medical Ethics Committee (METC) of the University Medical Center Utrecht (UMCU). The METC concluded that it did not fall within the remit of the Law on Medical Scientific Research involving Human Beings.

### Patient part (September 2011–February 2012)

#### Participants

Eligible patients were 18 years of age or older, had been using ICS for at least one year, and had filled two or more ICS prescriptions in the preceding year; the latter criterion was to include only daily ICS users. Patients who were living in an institution (e.g., a nursing home or assisted living facility) were excluded. For the purpose of the present study, data were used only of patients who reported having asthma (symptoms) *without* COPD.

#### Procedure

Patients were recruited in twelve community pharmacies; these pharmacies had participated in a previous study in cooperation with the Utrecht Pharmacy Practice Network for Education and Research (UPPER) [24]. A total of 1952 eligible patients were sent an information package, consisting of an invitation letter, a questionnaire, and an informed consent form, by their pharmacists. To participate in the study, patients had to return the completed questionnaire and a signed informed consent form.

### Pharmacy part (January 2014–March 2014)

#### Participants

All 1269 community pharmacists belonging to the UPPER network were eligible to participate; no further inclusion or exclusion criteria were applied. Pharmacy technicians were eligible if they were experienced in instructing patients in inhaler techniques, as determined by the pharmacists.

#### Procedure

To recruit pharmacists, UPPER sent an e-mail to the community pharmacists belonging to the UPPER network. The e-mail

contained information about the study and a secure web link to an online questionnaire. To reach more pharmacists and to recruit pharmacy technicians, pharmacists were requested to send this e-mail to other pharmacists and pharmacy technicians at their pharmacy. The pharmacists and pharmacy technicians from the 12 pharmacies who had already participated in the initial study ( $n = 24$ ) were invited to participate again in this study via e-mail, and the secure web link was also sent to them.

### Questionnaires and measures

The questionnaire for both patients and pharmacists/pharmacy technicians included questions on sociodemographic characteristics. Patients were asked about the indication for ICS prescription (asthma (symptoms), COPD, or not known). Data on pharmacists' and technicians' experience in education and counseling patients about ICS was collected as well.

In addition, the validated Beliefs about Medicines Questionnaire (BMQ-specific) was used to measure specific beliefs about ICS. This questionnaire had been developed initially for patients [12]. The BMQ-specific contains a 'necessity' scale and a 'concerns' scale. An example of a 'necessity' item is: 'Without these medicines, I would be very ill', and of a 'concerns' item: 'These medicines disrupt my life'. Each scale consisted of five items originally, but a sixth item, i.e., 'ICS give me unpleasant side effects', can be added to the 'concerns' scale, depending on the reliability of the scale. All eleven items were included in this study.

Patients filled out the original version of the BMQ-specific, whereas pharmacists and pharmacy technicians completed two versions of the BMQ-specific. First, the BMQ-specific was adapted to assess pharmacists' and pharmacy technicians' own ICS beliefs; these changes were approved by the developer of the BMQ-specific [25]. Items were rephrased so that pharmacists and pharmacy technicians could answer them from their own perspective. Examples are: 'These medicines disrupt the life of my patients' and 'Without these medicines, my patients would be very ill'. Second, to assess pharmacists' and pharmacy technicians' perceptions of patients' ICS beliefs, they had to complete the original, unadapted, BMQ-specific. This time they had to complete it from the perspective of their patients. The instruction was to fill it out in the way they thought most of their patients with asthma would complete it.

BMQ items were rated on a 5-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. The scores were added up for each scale, where higher scores indicate stronger beliefs. The 'necessity' scale sum scores were divided by 5, resulting in a scale score ranging from 1 to 5 (midpoint: 3). The internal consistency of the 'necessity' scales was sufficient to good (range of Cronbach's  $\alpha$ : 0.70–0.84). To reach an acceptable internal consistency for all versions of the 'concerns' scale, the sum score was calculated on the basis of four items instead of five (or six) items (range of Cronbach's  $\alpha$ : 0.60–0.77). The item 'I have insufficient knowledge about the effects of ICS' was excluded. Sum scores of the 'concerns' scale were divided by 4, resulting in a scale score ranging from 1 to 5 (midpoint: 3). 'Necessity' and 'concerns' scores below the scale midpoint ( $<3$ ) were considered to be 'low', and scores from midpoint and above ( $\geq 3$ ) were considered to be 'high'.

### Statistical analysis

Data were analyzed using Stata version 13. Descriptive statistics were used to describe the characteristics of the study participants. Two-sample *t*-tests and a Pearson's chi-squared test were performed to compare the characteristics of pharmacists and pharmacy technicians who did not fill out the questionnaire entirely (i.e., non-completers) with the characteristics of those who did complete it. Data for non-responding patients was not available. Two-sample *t*-tests were also performed to compare the mean values of the patient BMQ scores, with the pharmacists' and pharmacy technicians' BMQ scores.

### Results

#### Study sample

A total of 429 patients (22.0%) responded, of whom 169 patients reported having asthma (symptoms) without COPD. Of these, 161 completed the BMQ-specific sufficiently for calculations of scale scores and were therefore included in this study. The mean age was 56.2 years ( $SD = 16.8$ ), and the majority of the patients were female (67.3%).

Of the 1269 pharmacies approached, 1257 pharmacists received the invitation (there were 12 e-mail delivery errors). The link to the questionnaire was opened by 174 pharmacists and 106 pharmacy technicians, and completed by 136 pharmacists and 90 pharmacy technicians. Non-completers ( $n = 54$ ) did not differ from completers in age, gender, and own medication beliefs (these parts were filled in by all pharmacists and pharmacy technicians who opened the link). Of the completers, a small majority of the pharmacists were female (56.6%) whereas almost all pharmacy technicians were female (98.9%). The mean age of the pharmacists was 41.5 years ( $SD = 11.8$ ), and that of the pharmacy technicians was 41.4 years ( $SD = 11.2$ ).

In everyday practice, approximately one third of the responding pharmacists and a quarter of the responding pharmacy technicians reported that they did not provide counseling sessions (i.e., consultations in which patients' experiences with medication use is discussed to monitor patients' health and/or medication use) for ICS at their pharmacy (Table 1).

#### Beliefs about ICS

Table 2 shows the percentages of patients, pharmacists and pharmacy technicians who had high scores on the 'necessity' and 'concerns' scales. The majority of the patients with asthma (65.2%) had high scores on the 'necessity' scale, and about one-third (34.8%) had low 'necessity' scores. Most patients (78.9%) had low scores on the 'concerns' scale. Regarding the perceptions of patients' beliefs, most pharmacists (89.7%) and pharmacy technicians (87.8%) assessed patients as having high 'necessity' scores and around 80% of them believed patients to have concerns. The majority of pharmacists (95.6%) and pharmacy technicians (92.2%) had high ICS 'necessity' scores, and low 'concern' scores themselves (86.8% and 80.0%, respectively).

Table 3 presents the individual items in the BMQ and the patients', pharmacists' and pharmacy technicians' mean scores

Table 1. Patient, pharmacist and pharmacy technician characteristics.

Patient characteristics	<i>n</i> = 161			
Female <sup>a</sup>	107 (67.3%)			
Age in years <sup>a</sup>	56.2 (16.8)			
Mean (SD)	(20–87)			
(range)				
Age group, years <sup>a</sup>				
18–44	42 (26.1%)			
45–64	64 (39.8%)			
65 or over	53 (32.9%)			
Educational level <sup>a</sup>				
Low	46 (28.6%)			
Intermediate	37 (23.0%)			
High	76 (47.2%)			
Ethnicity <sup>b</sup>				
Dutch	124 (77.0%)			
Western background	21 (13.0%)			
Non-Western background	12 (7.5%)			
Pharmacist and pharmacy technician characteristics	Pharmacists <i>n</i> = 136		Pharmacy technicians <i>n</i> = 90	
Female	77 (56.6%)		89 (98.9%)	
Age in years	41.5 (11.8)		41.4 (11.2)	
Mean (SD)	(25–76)		(20–63)	
(range)				
Experience with dispensing of first and second ICS prescriptions (DP) and counseling sessions (CS) with patients about ICS	DP	CS	DP	CS
No	0	31 (22.8%)	0	24 (26.7%)
Yes, usually at the counter	40 (29.4%)	59 (43.4%)	12 (13.3%)	41 (45.6%)
Yes, usually in private room	96 (70.6%)	46 (33.8%)	78 (86.7%)	25 (27.8%)

<sup>a</sup>2 missing values.<sup>b</sup>4 missing values.

to illustrate the results. The mean scores of the ‘necessity’ items were high for all groups except the item ‘Without ICS I would be very ill’, which was given a mean score below the scale midpoint by the patients. Regarding the personal beliefs of patients, pharmacists and pharmacy technicians, the mean scores of the ‘concerns’ items were low, except for the item ‘ICS give my patients unpleasant side effects’, which had a high score in the pharmacy technicians group. On the other hand, all the mean scores of items about pharmacists’ and pharmacy technicians’ perceptions of patients’ beliefs were high, except the item ‘ICS disrupt my life’.

#### *Differences between patients, pharmacists and pharmacy technicians in assessing necessity beliefs*

Two-sample *t*-tests revealed that patients on the one hand and pharmacists and pharmacy technicians on the other hand, differ in the (perceived) degree of necessity of ICS (Table 4). Patients’ ‘necessity’ scores (mean = 3.2 ± SD = 0.8) were lower on average than pharmacists’ and pharmacy technicians’

perceptions of patients’ necessity beliefs (pharmacists: 3.5 ± 0.5, *p* < 0.01; pharmacy technicians: 3.6 ± 0.6, *p* < 0.001). In addition, the patients’ mean ICS necessity score was significantly lower than the pharmacists’ own mean score (3.7 ± 0.5, *p* < 0.0001) and the pharmacy technicians’ own mean score (3.6 ± 0.5, *p* < 0.0001). No significant differences were found between the pharmacists’ ‘necessity’ scores and the pharmacy technicians’ scores, or between the two groups’ perceptions of patients’ necessity beliefs.

#### *Differences between patients, pharmacists and pharmacy technicians in assessing concerns*

Pharmacists and pharmacy technicians thought that patients’ ‘concerns’ scores were higher than the actual patients’ ‘concerns’ scores (patients: 2.3 ± 0.8; pharmacists: 3.3 ± 0.5, *p* < 0.0001; pharmacy technicians: 3.3 ± 0.6, *p* < 0.0001) (Table 5). Patients had a significantly higher mean ‘concerns’ score than pharmacists (2.1 ± 0.7, *p* < 0.05), but no difference was found with pharmacy technicians’ own concerns.

Table 2. Percentages of patients, pharmacists and pharmacy technicians giving a high score on the ‘necessity’ and ‘concerns’ scales.

	Patients	Pharmacists: perceptions of patients’ beliefs	Pharmacists	Pharmacy technicians: perceptions of patients’ beliefs	Pharmacy technicians
High score on ‘necessity’ scale	65.2%	89.7%	95.6%	87.8%	92.2%
High score on ‘concerns’ scale	21.1%	78.7%	13.2%	84.4%	20.0%

Table 3. Mean scores for all original and adapted items of the BMQ-Specific.

	Patients	Pharmacists: perceptions of patients' beliefs	Pharmacists	Pharmacy technicians: perceptions of patients' beliefs	Pharmacy technicians
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
<b>Necessity items</b>					
<sup>1</sup> My health, at present, depends on ICS	3.2 (1.1)	3.5 (0.8)	-	3.6 (0.9)	-
<sup>2</sup> My patients' health, at present, depends on ICS	-	-	3.6 (0.8)	-	3.4 (0.8)
<sup>1</sup> My life would be impossible without ICS	3.3 (1.0)	3.5 (0.8)	-	3.7 (0.7)	-
<sup>2</sup> My patients' life would be impossible without ICS	-	-	3.9 (0.7)	-	3.7 (0.7)
<sup>1</sup> Without ICS I would be very ill	2.8 (1.2)	3.4 (0.8)	-	3.6 (0.8)	-
<sup>2</sup> Without ICS my patients would be very ill	-	-	3.5 (0.8)	-	3.5 (0.8)
<sup>1</sup> My health in the future will depend on ICS	3.3 (0.9)	3.4 (0.7)	-	3.4 (0.8)	-
<sup>2</sup> The future health of my patients will depend on ICS	-	-	3.7 (0.7)	-	3.5 (0.7)
<sup>1</sup> ICS protect me from becoming worse	3.5 (0.9)	3.7 (0.6)	-	3.7 (0.6)	-
<sup>2</sup> These medicines protect my patients from becoming worse	-	-	4.1 (0.6)	-	4.0 (0.5)
<b>Concern items</b>					
<sup>1</sup> Having to take ICS worries me	2.2 (1.0)	3.6 (0.8)	-	3.5 (0.8)	-
<sup>2</sup> It worries me that my patients have to take ICS	-	-	2.0 (0.8)	-	2.3 (0.7)
<sup>1&amp;2</sup> I sometimes worry about long-term effects of ICS	2.9 (1.3)	3.8 (0.7)	2.4 (0.9)	3.7 (0.8)	2.9 (0.8)
<sup>1&amp;2</sup> I have insufficient knowledge about the effects of ICS*	2.5 (1.1) <sup>a</sup>	3.2 (0.9)	2.2 (1.2)	3.1 (0.9)	2.6 (1.2)
<sup>1</sup> ICS disrupt my life	1.6 (0.8)	2.5 (0.7)	-	2.7 (0.9)	-
<sup>2</sup> ICS disrupt the life of my patients	-	-	1.9 (0.8)	-	2.2 (0.6)
<sup>1</sup> I sometimes worry about becoming too dependent on ICS	2.3 (1.1)	3.2 (0.8)	-	3.5 (0.9)	-
<sup>2</sup> I sometimes worry that my patients are becoming too dependent on ICS	-	-	2.1 (1.0)	-	2.4 (0.7)
<sup>1</sup> ICS give me unpleasant side effects*	2.3 (1.1) <sup>b</sup>	3.4 (0.7)	-	3.4 (0.7)	-
<sup>2</sup> ICS give my patients unpleasant side effects*	-	-	2.8 (0.9)	-	3.1 (0.8)

BMQ-Specific, ©Professor Robert Horne, University of Brighton.

Mean BMQ-scores range between 1-5. Higher scores refer to stronger beliefs.

<sup>a</sup>2 missing values.

<sup>b</sup>1 missing value.

<sup>1</sup>Original BMQ-item.

<sup>2</sup>Adapted BMQ-item.

\*Not included for calculation of sum score of 'concerns' scale.

Pharmacists' mean 'concerns' score was significantly lower than pharmacy technicians' mean 'concerns' score ( $2.1 \pm 0.7$  vs.  $2.4 \pm 0.5$ ,  $p < 0.0001$ ), but their perceptions of patients' concerns did not differ.

## Discussion

Our findings show that there are differences in ICS beliefs between patients with asthma, community pharmacists and pharmacy technicians, and between patients' beliefs and pharmacists' and pharmacy technicians' perception of patients'

beliefs. Pharmacists and pharmacy technicians overestimate the extent to which patients consider ICS to be a necessity, but they also overestimate the extent of the concern beliefs. Their perceptions of patients' concern beliefs are different from their own beliefs. Pharmacists, and to some extent pharmacy technicians, hold more positive beliefs about ICS than patients with asthma.

First, pharmacists and pharmacy technicians thought patients would rate their personal need for ICS much higher than they actually did. Their overestimation of patients' ICS necessity beliefs might suggest that pharmacists and pharmacy

Table 4. Results of two-sample *t*-tests of differences in the ICS necessity beliefs of patients with asthma, pharmacists and pharmacy technicians, and of pharmacists' and pharmacy technicians' perceptions of patients' necessity beliefs.

	M (SD)	Pharmacists: perceptions of patients' necessity beliefs	Pharmacists	Pharmacy technicians: perceptions of patients' necessity beliefs	Pharmacy technicians
		3.5 (0.5)	3.7 (0.5)	3.6 (0.6)	3.6 (0.5)
Patients	3.2 (0.8)	$p < 0.01$	$p < 0.0001$	$p < 0.001$	$p < 0.0001$
Pharmacists: perception of patients' necessity beliefs	3.5 (0.5)	—	—	ns	—
Pharmacists	3.7 (0.5)	—	—	—	ns

ns = not significant.

Table 5. Results of two-sample *t*-tests of differences in the ICS concerns of patients with asthma, pharmacists, and pharmacy technicians, and of pharmacists' and pharmacy technicians' perceptions of patients' concerns.

	<i>M</i> (SD)	Pharmacists: perceptions of patients' concerns	Pharmacists	Pharmacy technicians: perceptions of patients' concerns	Pharmacy technicians
		3.3 (0.5)	2.1 (0.7)	3.3 (0.6)	2.4 (0.5)
Patients	2.3 (0.8)	$p < 0.0001$	$p < 0.05$	$p < 0.0001$	ns
Pharmacists: perceptions of patients' concerns	3.3 (0.5)	—	—	ns	—
Pharmacists	2.1 (0.7)	—	—	—	$p < 0.0001$

ns = not significant.

technicians are not yet paying enough attention to patients' necessity beliefs. However, it seems important to emphasize the need for ICS in the enhancement of adherence since a positive relationship between necessity beliefs and ICS adherence has been found [10,11,13]. Our results also show that about one-third of the patients doubted the necessity of ICS, so the necessity beliefs of ICS could be strengthened in this large group. That patients doubt the necessity of ICS might be due to the perception that ICS are not associated with the immediate relief of the symptoms of airways constriction in the same way that bronchodilators are [10]. The inflammatory effect of ICS can be seen only in the long term, so the effect is not as noticeable as the effect of bronchodilators. Providing more information and increasing knowledge about ICS might therefore be of importance [26].

In contrast, pharmacist and pharmacy technicians expected that patients would experience more concerns about ICS than patients actually did. Although pharmacists themselves are less concerned, they imagine that patients can be concerned. It has to be noted that in this study fewer patients (21.1%) had concerns than in previous studies, in which more than one third of patients with asthma were reported to have concerns [8,11]. In the light of the results of these earlier studies, the perceptions of patients' ICS concerns by pharmacists and pharmacy technicians might be not as much of an overestimate as is suggested in our study.

Furthermore, regarding pharmacists' and pharmacy technicians' own beliefs, we found that both categories of provider have higher ICS necessity beliefs than patients do. Pharmacists have fewer concerns about ICS than patients. So pharmacists have more positive beliefs about ICS than patients do (because pharmacists gave higher scores for the necessity of ICS and lower scores for concerns), and pharmacy technicians are more positive in terms of ICS necessity. These discrepancies in ICS beliefs between providers and patients could hinder providers in achieving patient-centered communication and alignment. If providers have few concerns about potential adverse effects, they might assume that their patients share a similar positive view of the treatment and therefore be less inclined to elicit specific concerns (e.g., side effects, long-term effects, fear of dependency) that might be of importance to the patient and even act as a barrier to adherence and persistence.

To prevent possible negative influences of discrepancies in communication, more attention should be paid to patients' beliefs about medication and how these are related to medication adherence. George and colleagues have explored the themes that are discussed during contacts between patients with asthma and their primary care provider. They found that

providers initiate a talk about modifiable ICS beliefs only when they have prior knowledge of patients' negative ICS beliefs [27]. Also, healthcare providers' medication beliefs and their perceptions of patients' beliefs should be taken into account. Being aware of providers' own thoughts, possible discrepancies, and (unconscious) processes in behavior and communication could make communication more patient-centered. Besides, just communicating in a more patient-centered way could change providers' perceptions of patients' beliefs. Using more patient-centered communication enables the healthcare provider to learn about patients' thoughts and concerns and could change their incongruent perceptions. The results might indicate that pharmacists and pharmacy technicians need to improve their affective and responsive communication skills (e.g., through training and educational courses) to become more patient-centered and to explore and elicit the actual beliefs of patients more thoroughly.

Findings from this study indicate that pharmacists and pharmacy technicians differ in their concerns about ICS. Pharmacy technicians are somewhat more concerned than pharmacists, but they have a similar assessment of the necessity of ICS. The result is in line with a previous study that showed that pharmacy technicians held slightly more negative *general* beliefs about medication than pharmacists; to some extent, pharmacy technicians thought medicines to be more harmful, whereas pharmacists believed medicines to be slightly more beneficial [19]. Pharmacy technicians and patients do not differ in their own degree of ICS concerns. A possible explanation for this similarity is that technicians have more frequently contact with patients than pharmacists [28], which might influence the pharmacy technicians' beliefs.

We showed that pharmacists' and pharmacy technicians' perceptions of patients' beliefs and their own beliefs differ from those of patients with asthma, which might have clinical implications. More research is needed to study whether this incongruence affects patient-provider communication, ICS adherence and consequently self-management and patient outcomes, such as quality of life and asthma control.

We suggest that it is important to make pharmacists and pharmacy technicians aware of the fact that patients' beliefs in the necessity of ICS are not as strong as they expect. A topic for future research is the question of whether making providers aware of their patients' perceptions is sufficient for them to act in a more patient-centered way or whether their own ICS beliefs are more dominant in influencing their communicative behavior. The relationship between the agreement between providers' beliefs and patients' beliefs on the one hand and achieving concordance on the other is also a new subject to investigate.



### Limitations

To our knowledge, this is the first study comparing patients' ICS beliefs with the beliefs of pharmacists and pharmacy technicians. In addition, no previous research also took health-care providers' perceptions of patients' beliefs into account, which is a valuable addition to the research on provider-related characteristics and communication.

However, there are some limitations. We were not able to make pairwise comparisons between pharmacies and their own patients and therefore we could not investigate the actual discrepancies between patients' beliefs and their providers' beliefs and perceptions. Instead, the measured providers' perceptions about patients' beliefs are, in a way, 'generalizations'. A more robust methodology for this type of study would be a one-to-one comparison where the patient fills out the BMQ and the pharmacists or technician fills out the BMQ for that specific patient.

Furthermore, the BMQ was originally developed to measure *patients'* medication beliefs. In our study, we also used the BMQ to assess the ICS beliefs of pharmacists and technicians and their perceptions of patients' ICS beliefs. As reported in this article, the internal consistency of the different 'concerns' scales was not high, and therefore not all the original items were included in this scale. Because the BMQ was not developed and validated for use in this way, the outcomes should be interpreted carefully. In future research, the development and validation of comparable tools is of importance in order to measure health-care providers' beliefs and their perceptions of patients' beliefs in a sound way.

Another limitation is that the selection of our sample of patients with asthma (symptoms) was based on self-report. Such self-reported diagnostics are not entirely reliable because of their subjectivity, and this might have consequences for the representativeness of our sample and the implications that follow from our results. It is possible that we have included patients with Chronic Obstructive Pulmonary Disease (COPD). Because of the differences in the nature and implications of these diseases, patients with COPD might have different experiences with and beliefs about ICS than patients with asthma. However, suboptimal ICS adherence is a problem in patients with COPD as well [29,30]. Also, it has been found that beliefs (e.g., concerns about medication) are related to suboptimal medication adherence in patients with COPD [31,32]. Therefore, the two different patient groups are not likely to differ greatly in their ICS beliefs.

Also, selection bias could have occurred, which can limit the generalizability of our results. Participating pharmacists, pharmacy technicians and patients could have different characteristics to non-participants because they could be more engaged in this topic of research, and therefore could have non-representative beliefs about asthma and ICS. The occurrence of selection bias could be an explanation for different findings compared to other studies regarding the level of patients' concerns. In addition, the average age of the patients in our study sample was 56.2 years, which is higher than the average age of the general population of patients with asthma in the Netherlands and therefore limits the representativeness of our sample [33].

Finally, the data were obtained in two different periods, in 2011–2012 and in the beginning of 2014. This difference might have influenced our outcomes, as significant information on ICS might have been published between these two periods, making the two periods less comparable. However, there were no new developments regarding ICS between the two measurements.

### Conclusion

Pharmacists and technicians seem to judge patients to have stronger necessity beliefs than is actually the case. When pharmacists and technicians were asked to report the views of a 'typical patient', they reported patients as being more convinced of their need for daily ICS than reflected in the mean ratings for ICS necessity beliefs reported by patients. Pharmacists and pharmacy technicians generally hold more positive beliefs about ICS than patients with asthma. If pharmacists and technicians assume that patients share their positive views about ICS, this might mean that they will be less likely to elicit patients' ICS doubts and concerns and therefore will be less likely to address the beliefs that act as barriers to adherence and persistence to essential medication for asthma.

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### Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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