ORIGINAL RESEARCH

Words that make pills easier to swallow: a communication typology to address practical and perceptual barriers to medication intake behavior

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Purpose: The barriers to patients' successful medication intake behavior could be reduced through tailored communication about these barriers. The aim of this study is therefore (1) to develop a new communication typology to address these barriers to successful medication intake behavior, and (2) to examine the relationship between the use of the typology and the reduction of the barriers to successful medication intake behavior.

Patients and methods: Based on a literature review, the practical and perceptual barriers to successful medication intake behavior typology (PPB-typology) was developed. The PPB-typology addresses four potential types of barriers that can be either practical (memory and daily routine barriers) or perceptual (concern and necessity barriers). The typology describes tailored communication strategies that are organized according to barriers and communication strategies that are organized according to provider and patient roles. Eighty consultations concerning first-time medication use between nurses and inflammatory bowel disease patients were videotaped. The verbal content of the consultations was analyzed using a coding system based on the PPB-typology. The Medication Understanding and Use Self-efficacy Scale and the Beliefs about Medicine Questionnaire Scale were used as indicators of patients' barriers and correlated with PPB-related scores.

Results: The results showed that nurses generally did not communicate with patients according to the typology. However, when they did, fewer barriers to successful medication intake behavior were identified. A significant association was found between nurses who encouraged question-asking behavior and memory barriers ($r = -0.228$, $P = 0.042$) and between nurses who summarized information ($r = -0.254$, $P = 0.023$) or used cartoons or pictures ($r = -0.249$, $P = 0.026$) and concern barriers. Moreover, a significant relationship between patients' emotional cues about side effects and perceived concern barriers ($r = 0.244$, $P = 0.029$) was found as well.

Conclusion: The PPB-typology provides communication recommendations that are designed to meet patients' needs and assist providers in the promotion of successful medication intake behavior, and it can be a useful tool for developing effective communication skills training programs.

Keywords: interpersonal communication, tailoring, adherence, coding provider-patient interaction, beliefs, self-efficacy

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Introduction

Medication is a keystone of modern treatment, especially for patients with chronic intestinal illness such as inflammatory bowel disease (IBD).[1] Despite the proven effectiveness of medication, nonadherence has been reported in over 40% of patients

taking maintenance therapies for IBD.[2] Poor medication intake behavior can be either unintentional or intentional. For example, if a patient is not able to recall medical information due to memory problems, this could result in unintentional nonadherence.[1,3] If, on the other hand, a patient chooses not to take the medication because of a fear of side effects, this would be intentional nonadherence. Both unintentional and intentional nonadherence can be the result of practical or perceptual barriers. These types of barriers can contribute to the problem of unintentional and intentional nonadherence and must be addressed if adherence rates are to be improved.[4] Practical barriers (eg, memory barriers due to limitations in cognitive capacity and resources) influence the ability to implement the instructions to follow the treatment. Perceptual barriers (eg, the lack of belief in the necessity of the medication) are based on an internal negotiation between the perceived necessity of the treatment and any concerns relating to it, and these factors influence a patient's motivation to start and continue the treatment.[2]

Communication is a powerful tool to promote successful medication intake behavior.[5] Zolnierek and Dimmatteo[6] show that the patients of providers who communicate well have a 19% higher medication adherence than patients whose providers do not communicate effectively.[6] "Words that make pills easier to swallow," ie, the ways in which effective communication leads to successful medication intake behavior, have been described in previous studies. These studies have mainly focused on the exchange of information during prescription medication consultations.[7] Although these studies have provided valuable information about medical communication, they have not related communication strategies to specific barriers to successful medication intake behavior. These barriers vary between patients and patient groups and require the development of effective communication strategies that are designed to meet the needs of patients.[8] Because poor medication intake behavior is considered to be a widespread problem,[4] it is remarkable that no study has adequately described which different communication strategies designed to meet the specific needs of the patient, can be used in addressing specific barriers to successful medication intake behavior.

The purpose of this study is therefore (1) to develop a new communication typology to address the barriers to successful medication intake behavior, and (2) to examine the relationship between the use of the typology and the reduction of these barriers. To address the second aim, we formulated two research questions: (1) to what extent do nurses communicate according to the practical and perceptual barriers to successful medication intake behavior (PPB-typology), and (2) to what extent does the use of these communication strategies reduce barriers to successful medication intake behavior?

Developing the typology

To address the first aim we reviewed the literature concerning communication and medication intake behavior. Table 1 describes the possible practical and perceptual barriers to successful medication intake behavior that might be intentional or unintentional. Within the category of practical barriers we distinguished between "memory barriers" (mostly unintentional) and "daily routine barriers" (mostly intentional), and within the category of perceptual barriers we distinguished between "necessity barriers" (mostly unintentional) and "concern barriers" (mostly intentional). Table 2 gives an overview of the PPB-typology.

The typology describes restructured communication strategies that are organized according to the barriers on the one hand and the communication strategies, divided into provider versus patient and instrumental versus affective communication, on the other hand. These types of communication strategies are further elaborated in the following sections.

General communication strategies

Effective communication serves the patients' need to understand (instrumental or cognitive needs) and to be understood (affective or socio-emotional needs).[9] Regardless of the type of barriers a patient may have, providers should always use general instrumental and affective communication strategies.[10] General instrumental communication strategies include using medication intake-promoting communication,

Table 1 Types of practical and perceptual barriers

	Example
Practical barriers	
Memory barriers (eg, limitations of capacity and resources)	"Sometimes I forget to take my medication"
	"It is not easy for me to understand how to take the medication"
Daily routine barriers (eg, inconvenience of the medical regime)	"If I have a party, I sometimes decide not to take my medication"
	"It is not easy for me to implement the medication regimen in my daily life"
Perceptual barriers	
Necessity barriers (eg, lack of belief in the necessity of the medication)	"Sometimes I quit taking medication to discover if I still need the medication"
	"I don't need this medication"
Concern barriers (eg, concerns and beliefs)	"I am concerned about the side effects"
	"I am worried that I will become too dependent on this medication"

Table 2 PPB-typology: communication strategies addressing barriers to medication intake behavior

	Provider		Patient	
	Instrumental communication	**Affective communication**	**Instrumental communication**	**Affective communication**
Practical barriers				
Memory barriers (eg, limitations of capacity and resources)	1. General instrumental communication 2. Instrumental communication addressing barriers • Recall-promoting techniques • Encouraging question-asking behavior • Involving the patient in the problem-solving and decision-making process • Asking the patient questions about used information sources	1. General affective communication	1. General instrumental communication 2. Instrumental communication addressing barriers • The use of Internet and written education of the hospital • Patient participation, especially interrupting the provider when information is unclear or asking questions • The verbalization of difficulties reading instruction leaflet/labels, comprehending treatment information, recalling medication instructions, combinations of medication	1. General affective communication
Daily routine barriers (eg, inconvenience of the medical regime)	1. General instrumental communication 2. Instrumental communication addressing barriers • Asking questions whether patients' are able to implement the treatment regimen in daily life • Giving information and advice how to implement the treatment regimen in daily life • Involving the patient in the problem-solving and decision-making process	1. General affective communication	1. General instrumental communication 2. Instrumental communication addressing barriers • The verbalization of difficulties concerning treatment regimen, taking medication, medication costs • Asking questions how to implement the treatment regimen in daily life • Participating in the problem-solving and decision-making process	1. General affective communication
Perceptual barriers				
Necessity barriers (eg, lack of belief in the necessity of the medication)	1. General instrumental communication 2. Instrumental communication addressing barriers • Giving information and advice about medical condition and the necessity of (changing the) therapeutic regimen • Involving the patient in the problem-solving and decision-making process • Emphasizing and repeating the most important reasons to change medication, checking with patients for understanding	1. General affective communication	1. General instrumental communication 2. Instrumental communication addressing barriers • Asking questions about the reasons to change medication and possible alternatives • Participating in the problem-solving and decision-making process	1. General affective communication

(Continued)

Table 2 (*Continued*)

	Provider		Patient	
	Instrumental communication	Affective communication	Instrumental communication	Affective communication
Concern barriers (eg, concerns and beliefs about medication)	1. General instrumental communication 2. Instrumental communication addressing barriers • Motivational interviewing techniques • Emphasizing and repeating important information once possible concerns and fears are reduced	1. General affective communication 2. Cue responding to emotional cues • Actively address patients' emotional cues • Reactively address patients' emotional cues • Avoiding disaffirming reactions in response to patients' emotional cues	1. General instrumental communication 2. Instrumental communication addressing barriers • Actively asking questions about the concerns	1. General affective communication 2. Verbalizing emotional cues

such as stressing the importance of taking the medication, and avoiding medication intake-hindering communication, such as saying it is acceptable for the patient to decide to take the medication on any given day. Moreover, the literature suggests that provider-centered communication, such as interrupting the patient, may have a negative effect on health outcomes.[5,11] Instead, providers should allow open discussions about potential difficulties and/or a poor medication intake history. Because prior poor medication intake behavior is an independent predictor of successful medication intake behavior,[12] exploring whether a patient has a poor medication intake history is essential. Consequently, it is important that providers respond adequately to patients who indicate that they have a poor medication intake history, eg, by exploring the reasons for the previous poor medication intake behavior. From the patients' perspective, it is important for them to verbalize any poor medication intake history they have.

In addition, many studies in patient-provider communication stress the importance of using general affective communication by patients and providers in medical consultations.[13] Affective communication refers to encouraging the patient to talk by showing concerns, establishing agreement, engaging in social conversation, and making jokes.[10] The ability to use affective communication is considered to be a necessary condition for adequate patient education, as well as an important predictor of the success of a consultation.[13] It enhances relationships, creates a safe atmosphere, generates trust, improves the comprehension and recall of information, and allows the decision-making process to occur,[5,10] and is therefore expected to improve medication intake behavior.[6]

Communication addressing memory barriers

Memory barriers are distinguished as the first type of practical barriers (see Tables 1 and 2) and relate to the patients' lack of self-efficacy regarding their ability to remember to take the medication, due to difficulties reading instruction leaflets and/or labels, comprehending treatment information, and recalling medication instructions and various combinations of medication. The term "self-efficacy" refers to one's belief in one's ability to successfully execute a behavior required to produce a certain outcome.[14,15] Memory barriers are practical and mostly unintentional, because they are often the result of cognitive processing problems. Recall of information (ie, the ability to understand and reproduce medical information) is a prerequisite for successful medication intake behavior.[16] Unfortunately, between 40% and 80% of medical information is almost immediately forgotten, and

almost half of medical information is incorrectly recalled[16] after it has been prescribed, which is likely to contribute to patients' incorrect medication intake. Communication strategies that aim to address memory barriers should focus on enhancing the comprehension and recall of medical information.

There are several instrumental communication strategies that can reduce memory barriers. Recall-promoting techniques include summarizing, categorizing, structuring, providing written information, using cartoons or pictures, emphasizing and repeating information, checking with patients for understanding, and avoiding recall-hindering techniques such as technical jargon.[17,18] Furthermore, patient participation is considered to be an important factor, as it is expected to result in improved recall of information.[19] Providers can increase patient participation by encouraging question-asking behavior during or after consultations or by involving the patient in the problem-solving and decision-making process. Problem-solving is defined here as the search for the correct solution to a problem. Decision-making is defined as a situation in which "a choice must be made between several alternatives, often involving trade-offs of harms and benefits."[20] Involving a patient in the problem-solving and decision-making process may lead to higher levels of recall.[11] In addition, it is important that providers ask the patient questions about used information sources, such as websites, and that they recommend reliable sources to prevent patients' exposure to inaccurate information.[21]

Patients can also contribute to the patient-provider interaction in several ways. For example, they can improve the decision-making process and enhance information recall by obtaining information and educating themselves prior to the consultation, eg, by seeking information from various sources, such as the Internet or written educational material from the hospital.[22] In addition, patients can interrupt the provider to direct the flow of information and ask for clarification when information is unclear.[10,23] Displaying proactive behavior, such as asking questions and verbalizing possible difficulties, has been shown to result in higher comprehension and improved recall of information.[19]

Communication addressing daily routine barriers

Daily routine barriers are the second type of practical barriers. These barriers refer to patients' self-efficacy with regard to taking their medication. These types of barriers are mostly intentional, because patients often actively decide not to take the medication, due to, for example, the costs of the medication or the inconvenience of the treatment regimen.[1]

Communication strategies should focus primarily on addressing the daily routine barriers using instrumental communication to explore and reduce possible problems in incorporating the medication regimen into daily practice.

By asking whether the patient perceives these barriers, the provider can assess which practical barriers the patient is experiencing. In addition, the provider can provide information and advice on how patients can implement the treatment in their daily life. Practical advice on how to manage treatment at home is one of the most prevalent needs of patients.[24] Patients, especially those with chronic illnesses, often make decisions about their treatment that fit their own personal circumstances.[25] It is therefore important to encourage the patient to be involved in the problem-solving and decision-making process. If possible, daily routine barriers should be discussed, and the treatment regimen should be understood and agreed upon, which may reduce patients' perceptions of these difficulties in their daily lives.

From a patient's perspective, it is essential to verbalize difficulties and actively ask for advice regarding how to manage expected difficulties, how to implement the treatment regimen in everyday life, and how to integrate medication protocols into his or her lifestyle.[3,23] It is also important for patients to actively participate in the problem-solving and decision-making process.

Communication addressing necessity barriers

Necessity barriers are the first type of perceptual barriers. These barriers refer to a lack of belief in the necessity of using medication and are mostly unintentional. Communication strategies that address these barriers should focus on adequate patient education about the treatment regimen and shared decision-making.[1]

Patients may have erroneous ideas about the need for medication, based on, for example, previous negative experiences or stories of other patients. Information and advice about the patients' medical condition and the rationale behind the therapeutic regimen may change these beliefs.[26] Moreover, the patients' beliefs in the necessity of the medication will be higher if they feel involved in the problem-solving and decision-making process, and if they eventually make a mutal agreement regarding their treatment.[3,23] In addition, the use of specific recall-promoting techniques by the provider, such as repeating and emphasizing the most important reasons to prescribe the medication and checking whether the patient has understood the importance of taking the medication, is recommended.[17]

From a patient's perspective, it is important to actively ask questions during the consultation about the reasons for taking the medication, to inquire about possible alternatives, and to take an active role in the problem-solving and decision-making process.[3]

Communication strategies addressing concern barriers

The fourth type of barrier that patients may encounter, which is the second type of perceptual barriers, is related to a patient's fears or concerns, eg, about the side effects of the medication or about becoming dependent on the medication. These barriers are mostly intentional.[1] General affective communicative strategies are especially important in addressing concern barriers, because they not only create a safe atmosphere between the provider and the patient but also encourage patients to disclose their emotions, concerns, and worries.[10] In addition, motivational interviewing techniques can be used to create a nonjudgmental and supportive environment in which the patient can be an active partner and feels free to express both motivation and reluctance or concerns about the treatment.[27] It is important that the provider listens and reflects on what the patient says and points out discrepancies between the patient's current and required behavior. These techniques can help the patient to resolve ambivalence about his or her own behavior and to identify factors that are barriers to following the treatment plan.[27]

In general, responding adequately to patients' emotional cues is essential. Emotional cues are verbal indications of an underlying unpleasant emotion or an explicit and a clear verbalization of experiencing an unpleasant emotional state.[28] Providers can actively (ie, on their own initiative) or reactively (ie, in response to the patients' emotional cues) address patients' emotional cues. If a patient expresses emotional cues, it is important for the provider to exhibit facilitating behavior (ie, addressing these emotional cues by exploring or acknowledging them[29] or offering minimal encouragement [eg, "aahhh" and "mmm"]).[30] An adequate response to these cues may encourage patients to further disclose their perspectives on the treatment.[31] It is important that providers actively (without an emotional cue) demonstrate the aforementioned facilitating behavior.

As the ability of patients to recall information can be negatively influenced by stress,[16] it is not only important to address patients' psychosocial and emotional needs, beliefs, concerns, and emotional cues but it is also recommended to emphasize and repeat important information after concerns and emotional cues have been addressed.[17]

From a patient's perspective, it is important to clearly verbalize emotions such as fear. Patients are generally more likely to disclose their emotions indirectly as opposed to directly, which creates the risk that their emotional cues will not be detected by the provider.[32] This failure of communication could have a negative effect on the patient's recall of information.[32,33] In addition, it is important that patients actively ask questions about any concerns or emotional issues they may have about treatment.

Testing the typology

In this section we turn to the second aim of this study by describing the methods used to test the typology. We describe how we analyzed the consultations between nurses and patients using the PPB-typology and the measures that were used to examine the barriers to patients' successful medication intake behavior.

Design

In this study, the communication skills of the nurses were investigated during their educational consultations with IBD patients at the start of immunosuppressive medication treatment. Eight specialized IBD nurses at five hospitals participated in this study. The PPB-typology was tested in consultations with IBD patients, because these patients represent a high-risk case with regard to not taking their medication as prescribed, particularly medications that are used for long-term therapies. This high-risk condition is due to the characteristics of the illness, which includes (long) inactive periods alternating with (chronic) active periods, and to medical therapy that is often inconvenient due to side effects.[34] Taking immunosuppressive medication is associated with an increased risk of rare but potentially serious adverse reactions such as cancer. Although the likelihood of developing cancer as a result of taking a medication for IBD is very low, as soon as these words are mentioned, patients are often struck with fear and do not hear much more of what is said afterwards.[35] Therefore, nurses have an increasingly important role in educating IBD patients about their treatment regimen.

The patient inclusion criteria for this study included: (1) a diagnosis of Crohn's disease or ulcerative colitis according to classical clinical, endoscopic, radiographic, and/or pathohistological criteria, as determined by an experienced gastroenterologist; (2) starting treatment with azathioprine, 6-mercaptopurine, infliximab, methotrexate, 6-thioguanine, or adalimumab for the first time; and (3) fluency in Dutch. Patients with prior acknowledged or diagnosed limited cognitive abilities were excluded.

The Medical Ethical Committee of the VU Medical Center, Amsterdam, The Netherlands, granted permission for this study, which was supplemented with local feasibility statements (Trial No NTR2892). The data were collected from September 2009 until January 2012.

## Procedure and participants

Patients were asked for written permission to videotape their consultation with an IBD nurse. First, anonymous questionnaires were collected prior to the consultation. In the questionnaire, patients were asked to specify their age, gender, education, diagnosis, and the length of time since diagnosis. Second, the consultations were recorded on video. Third, a follow-up questionnaire, containing questions concerning the barriers perceived by the patients, was administered during a telephone interview 3 weeks after the videotaped consultation.

When the patient entered the consultation room, the researcher switched on the video camera and left the room before the consultation started. Although the providers noted some stress at the beginning of the study, they did not report stress afterwards. Providers usually described each consultation as a typical consultation reflecting an average situation.

Of the 110 eligible patients, 19 (17.3%) refused to participate: eight did not want their consultation to be videotaped, five felt too sick or too tired, and six felt overwhelmed or were too busy. Another eleven participants (10.0%) were excluded: seven patients decided not to start the prescribed medication after the consultation, three video recordings were missing due to technical problems, and one patient appeared to have cognitive problems. The consultations of all of the remaining patients (N = 80) were analyzed (see Figure 1). A non-response analysis revealed that nonparticipating patients were younger (mean [M] = 35.6, standard deviation [SD] = 11.4) than participating patients (M = 40.1, SD = 14.6; $P > 0.05$). There was no difference in gender between participants and nonparticipants.

Analyzing the consultations

All of the consultations were transcribed verbatim. The verbal content was analyzed using a protocol that was based on the PPB-typology. Categories of several validated coding instruments were used as a basis for the developed typology. Only those items in which previous research suggested that there is a relationship between communication and medication intake behavior were included. Because some of the communication strategies of the several validated instruments overlap,
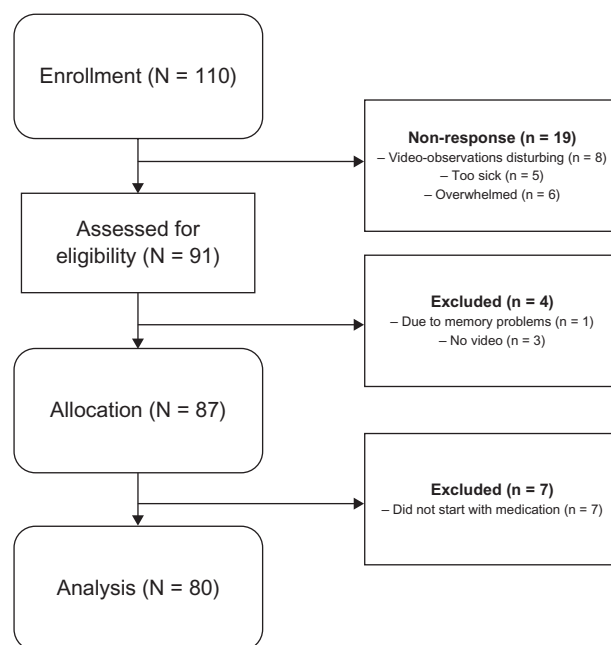
Figure 1 Consort flow diagram of patients' non-response (N = 80).

certain categories are based on more than one instrument. Only utterances that contained a topic that fitted in one of the categories of the protocol were scored. An utterance is a communicative unit that conveys one thought or is related to one specific interest. An utterance can vary in length from one word to a sentence. Each utterance was considered to be mutually exclusive.[36] The complete protocol can be obtained from the first author. Tables 3 and 4 show the primary instruments and the literature on which the protocol was based.

The conversations between the nurse and the patient were coded by the first author and a trained research assistant. The first author, a university graduate in communication science and experienced in coding nurse-patient communication, trained the research assistant to code nurse-patient communication using the protocol. Guidelines were followed to minimize observer bias and reactivity. After 5 days of training, the "real" observations began. In addition, regular meetings of the team were held to discuss and resolve coding issues.

Reliability was tested using intraclass correlation coefficients (ICC) using a two-way mixed-effect model of consistency and single measure statistics. The ICC is often used to measure the reliability between two interval variables. To determine intercoder reliability, the observers both coded the same 13 (16%) video recordings. Intercoder reliability was measured for the communication categories that accounted for more than 1% of all utterances. Based on κ statistics criteria,[37] values between 0.21 and 0.40 are

Table 3 Communication strategies nurse (N = 8)

Nurse	M[a]	SD	%[b]	Based on
General instrumental communication				
Medication intake-promoting communication	0.7	1.4	0.2	6
Medication intake-hindering communication	0.1	0.5	0.0	6
Provider-centered communication	0.5	1.4	0.2	11
Interrupting patient	0.1	0.4	0.1	11
Neglecting question patient	0.0	0.2	0.1	11
Active: poor medication intake history	0.1	0.5	0.2	MIARS[29]
Active: exploring poor medication intake history	0.5	0.4	0.2	MIARS[29]
Active: acknowledging poor medication intake history	0	0.1	0	MIARS[29]
Reactive: after poor medication intake history	0.2	0.9	0.1	MIARS[29]
Reactive: exploring poor medication intake history	0.1	0.4	0.0	MIARS[29]
Reactive: acknowledging poor medication intake history	0.1	0.4	0.0	MIARS[29]
Reactive: minimal reaction	0	0.2	0.0	MIARS[29]
Reactive: neglecting	0.1	0.3	0.0	MIARS[29]
General affective communication nurse				
Affective communication	4.8	6.5	1.6	RIAS[10]
Showing concerns	0.1	0.5	0	RIAS[10]
Establishing agreement	2.4	2.1	0.9	RIAS[10]
Engaging in social conversation	1.4	2.4	0.5	RIAS[10]
Making jokes	1.0	1.5	0	RIAS[10]
Instrumental communication addressing barriers				
Recall-promoting techniques	27.9	12.8	9.3	RPT[17] and MI[27]
Summarizing	2.7	2.4	0.7	RPT[17]
Categorizing	0.6	1.0	0.2	RPT[17]
Structuring	2.1	1.9	0.8	RPT[17]
Providing written information	5.3	4.0	1.8	RPT[17]
Using cartoons or pictures	3.1	4.8	1.0	RPT[17]
Emphasizing and repeating information	12.3	7.1	4.2	RPT[17]
Checking with patients for understanding	1.8	2.0	0.6	RPT[17]
Recall-hindering techniques	22.6	11.3	7.5	RPT[17]
Promoting patient participation	4.7	3.9	1.5	RIAS[10,20]
Encouraging question-asking behavior during consultation	1.4	1.2	0.4	21
Encouraging question-asking behavior after consultation	1.2	2.5	0.4	21
Involving the patient in the problem-solving process	0.2	0.5	0.1	RIAS[10,20]
Involving the patient in the decision-making process	0.8	1.4	0.3	RIAS[10,20]
Involving the patient in the problem-solving logistic process	0.6	1.1	0.2	RIAS[10,20]
Involving the patient in the decision-making logistic process	0.5	1	0.2	RIAS[10,20]
Asking the patient questions about used information sources	0.3	0.7	0.1	21
Giving information and advice	180.0	64.5	60.8	RIAS[10]
Giving information (eg, about therapeutic regimen)	137.9	59.9	46.3	RIAS[10]
Giving advice (eg, about treatment regimen)	2.9	4.2	0.9	RIAS[10] and MI[27]
Giving general information (related to [medical] paperwork)	25.8	17.3	8.8	RIAS[10]
Giving general advice (related to [medical] paperwork)	0.2	0.9	0.1	RIAS[10]
Asking questions	13.2	7.3	4.7	RIAS[10]
Motivational interviewing techniques	1.0	1.8	0.3	MI[28]
Listening and reflecting	0.9	1.6	0.3	MI[28]
Pointing out discrepancies	0.1	0.4	0	MI[28]
Nurses response to emotional cues (cue responding)				
Actively addressing emotional cues	5.1	4.1	1.6	MIARS;[29] RIAS[10]
Active: exploring emotional cues	0.4	0.9	0.1	MIARS;[29] RIAS[10]
Active: acknowledging emotional cues	4.7	4.0	1.5	MIARS;[29] RIAS;[10] MI[27]
Reactively addressing emotional cues	9.6	9.1	3.2	
Reactive: exploring emotional cues	0.5	1	0.2	MIARS[29]
Reactive: acknowledging emotional cues	3.3	3.9	1.1	MIARS[29]
Reactive: minimal encouragement	2.4	3.6	0.8	MIARS[29,34]
Reactive: neglecting	3.4	4.5	1.2	MIARS[29,34]

Notes: [a]Mean number of utterances per category per consultation; [b]percentage based on the mean number of coded utterances that appeared in the consultations.
Abbreviations: RIAS, roter interaction analysis system; MIARS, Medical Interview Aural Rating Scale; MI, motivational interviewing; RPT, recall promoting techniques; SD, standard deviation.

Table 4 Communication strategies patient (N = 80)

Patient	M[a]	SD	%[b]	Based on
General instrumental communication				
The verbalization of poor medication intake behavior	0.2	0.7	0.1	6
General affective communication				
Affective communication	7.3	6.0	2.7	RIAS[10]
Establishing agreement	4.5	4.7	1.5	RIAS[10]
Engaging in social conversation	2.5	1.4	0.7	RIAS[10]
Making jokes	1.7	1.2	0.5	RIAS[10]
Instrumental communication addressing barriers				
The verbalization of difficulties	0.5	1.4	0.2	23
Concerning reading instruction leaflet/labels	0.0	0.0	0	23
Concerning comprehending treatment information	0.0	0.2	0	23
Concerning recalling medication instructions	0.0	0.2	0	23
Concerning combinations of medication	0.0	0.16	0	23
Costs of medication	0.1	0.5	0	23
Concerning treatment regimen	0.3	1.6	0.1	23
Patient participation	19.9	11.2	6.6	RIAS[10,11,20,21,23]
Problem-solving	0.2	0.6	0.1	RIAS[10,20,23]
Decision-making	0.3	0.7	0.1	RIAS[10,20,23]
Problem-solving logistic	0.5	0.9	0.2	RIAS[10,20,23]
Decision-making logistic	0.4	0.9	0.2	RIAS[10,20,23]
Interrupting the provider	0.4	0.9	0.1	11
Asking questions	17.2	10.0	5.5	RIAS[10]
The use of Internet	0.5	1.0	0.2	21
The use of written education from hospital	0.5	1.0	0.2	21
Patients' emotional cues				
Verbalizing emotional cues	11.2	10.0	3.8	32,33
Emotional cue: well-being patient	3.6	4.8	1.2	32,33
Positive emotional cue: previous medication	0.7	1.3	0.2	32,33
Emotional cue: towards side effects previous medication	1	1.6	0.3	32,33
Emotional cue: towards administration previous medication	0.4	0.8	0.2	32,33
Emotional cue: towards dependency previous medication	0.0	0.2	0	32,33
Emotional cue: towards necessity previous medication	0.2	0.5	0.1	32,33
Emotional cue: reassurance previous medication	0.1	0.6	0.1	32,33
Emotional cue: towards necessity previous medication despite education	0.1	0.3	0	32,33
Emotional cue: towards side effects	0.8	1.5	0.3	32,33
Emotional cue: towards administration	0.7	1.3	0.2	32,33
Emotional cue: towards dependency	0.1	0.3	0	32,33
Emotional cue: towards necessity	0.2	0.5	0.1	32,33
Emotional cue: towards necessity despite education	0.1	0.5	0.1	32,33
Emotional cue: reassurance	0.4	0.6	0.1	32,33
Emotional cue: other	3.1	4.1	1.0	32,33

Notes: [a]Mean number of utterances per category per consultation; [b]percentage based on the mean number of coded utterances that appeared in the consultations.
Abbreviations: RIAS, roter interaction analysis system; MIARS, ; SD, standard deviation.

considered fair, values between 0.41 and 0.60 are considered moderate, and values >0.61 are considered good. The ICC ranged between 0.6 and 1, with a mean ICC of 0.9, which is considered good.[37]

Instrumental communication

Nurses' instrumental communication consisted of eleven main categories, which included all categories with respect to information or advice about medical conditions, treatment, lifestyle, and information about the ward, administration, and services.[10] General instrumental main categories were medication intake-promoting communication intake-hindering communication, avoiding provider-centered communication, actively exploring poor medication intake history and reaction after a poor medication intake history.[11] Providers' instrumental communication addressing barriers were: using recall-promoting and recall-hindering techniques,[17,18,34] promoting patient participation,[20] asking the patient questions about used information sources,[21] giving information and advice, and using motivational interviewing techniques.[27] The general instrumental communication of the patients consisted of one main category: the verbalization of medication intake behavior.

Patients' instrumental communication addressing barriers consisted of two main categories, which were the verbalization of difficulties and patient participation.[23]

Affective communication

The nurses' general affective communication categories referred to those aspects that were needed to establish a trusting relationship between the provider and the patient, including showing concerns, establishing agreement, engaging in social conversation, and making jokes.[10] The nurses' response to emotional cues (cue responding) consisted of two categories, which were actively and reactively addressing cues. Based on the Medical Interview Aural Rating Scale system,[29] we distinguished exploring and acknowledging as modes of active response and exploring, acknowledging, neglecting, and providing minimal encouragement as modes of reactive responses.[30] Patients' general affective communication included one main category, which consisted of establishing agreement, engaging in social conversation, and making jokes. Patients' emotional cues consisted of one main category, which included emotional cues.[32,33] We made a distinction between emotional cues that pertained to previous or current medication and emotional cues that pertained to the new prescribed medication.

Measures of barriers

The questionnaire that was administered prior to the consultation included socio-demographic background characteristics and medical background characteristics. The questionnaire that was administered 3 weeks after the consultation included the Medication Understanding and Use Self-Efficacy Scale (MUSE)[15] and the Beliefs about Medicine Questionnaire (BMQ).[38]

Medication Understanding and Use Self-Efficacy Scale

The MUSE measured patients' self-efficacy in understanding and using prescription medication.[15] The scale consisted of two subscales, each including four items: (1) "MUSE-understanding self-efficacy" ($\alpha = 0.80$), measuring patients' self-efficacy related to their understanding of the medication (eg, "It is easy for me to understand instructions in medication leaflets."), and (2) "MUSE-use self-efficacy" ($\alpha = 0.91$), measuring patients' self-efficacy with regard to the action of taking their medication (eg, "It is easy to set a schedule to take my medication.").[15] Memory barriers referred to patients' cognitive information-processing problems.[1] Therefore, the "understanding self-efficacy" subscale was considered an indicator of perceived memory barriers. Daily routine

barriers referred to the perceived inconvenience of taking the medication according to the treatment regimen.[1] The "use self-efficacy" subscale measured possible barriers to the action of taking medication and was therefore considered an indicator of daily routine barriers. Scores on each scale were summed to give a score ranging from 5 to 20. A higher score indicated a lower level of self-efficacy.

The Beliefs about Medicine Questionnaire

The adapted version of the BMQ, known as the Dutch BMQ-specific, was used.[39] The BMQ measured patients' attitudes and beliefs regarding taking their medication and consisted of two separate subscales: (1) "BMQ-necessity," measuring beliefs about the necessity of taking medication (eg, "My life would be impossible without medication") (five items; $\alpha = 0.76$), and (2) "BMQ-concerns," measuring patients' concerns about taking medication (eg, "Having to take the medication worries me") (six items; $\alpha = 0.74$). Necessity barriers referred to patients' lack of belief in the necessity of the medication.[1] Therefore, the BMQ-subscale "necessity" was considered an indicator of necessity barriers. Concern barriers referred to concerns about the medication.[38] The BMQ-subscale "concerns" was therefore considered an indicator of concern barriers. Scores on the necessity subscale were summed to give a score ranging from 5 to 25 and a scale midpoint of 15. Scores on the concerns subscale were summed to give a score ranging from 6 to 30 and a scale midpoint of 18. A higher score indicated a stronger belief in the necessity or more concerns, respectively.

Data analysis

The data were analyzed using SPSS 20.0 (SPSS, Inc, Chicago, IL). The frequencies of the utterances were calculated and on interval level. The scores on the BMQ and MUSE were correlated with the scores for the communication categories using Pearson's bivariate correlations, with a significance level of $P < 0.05$. Pearson's correlations were calculated for the categories that occurred, on average, one or more times during a consultation. In total, 28 communication strategies occurred, on average, one or more times during a consultation and were correlated with the four barriers.

Results
Participants' characteristics

Two-thirds (66.3%) of the sample was female. Fifty-nine patients (73.8%) were diagnosed with Crohn's disease and 20 with ulcerative colitis (25.0%). The mean age was 40.1

(SD = 14.6) years, and almost half of the patients were highly educated (see Table 5). All of the eight nurses were female, with a mean age of 43.0 (SD = 11.9) years. The nurses had worked for an average of 4.7 (SD = 2.9) years as IBD nurses.

Communication characteristics

To investigate the first research question, we analyzed to what extent nurses communicate according to the PPB-typology. The consultations lasted, on average, 1780 (SD = 564.4) seconds, which means that the average consultation lasted 29 minutes. The mean number of coded utterances of each consultation was 295.5 (SD = 87.6). Nurses mostly employed instrumental communication during the consultations. A total of 60.8% of the coded utterances (M = 180.0) referred to provider categories giving information and advice, whereas 9.3% (M = 27.9) were devoted to recall-promoting techniques, and 7.5% (M = 22.6) were devoted to recall-hindering techniques. General affective communication was rarely found: 1.6% (M = 4.8) of the coded communication was coded as affective communication, and 3.2%

Table 5 Patients demographic characteristics

Characteristic patients		N = 80	%
Gender			
	Male	27	33.7%
Age			
	M (SD)	40.1 (14.6)	
	Range	18–80	
Type of disease			
	Crohn's disease	59	73.8%
	Colitis Ulcerosa	20	25.0%
	Other	1	1.3%
Diagnosed in years			
	M (SD)	9.93	(10.01)
	Range	0–40	
Educational level			
	Low	21	26.6%
	Moderate	27	34.2%
	Higher education	31	39.2%
	Other	1	1.3%
Living arrangements			
	Alone	17	21.3%
	With partner	20	25.0%
	With partner and child(ren)	20	25.0%
	With child(ren)	9	11.3%
	Other	14	17.5%
Children			
	Yes	39	48.8%
Employed			
	Yes	56	70.0%
Ethnicity			
	Dutch	70	87.5%
Religious			
	Yes	20	25.0%

(M = 9.6) was coded as cue-responding communication. Of all the cue-responding communication, 5.2% (M = 0.5) was exploring, 34.7% was acknowledging (M = 3.3), and 25.3% was minimal encouragement (M = 2.4); in addition, 35.4% of the emotional cues of the patients were neglected (M = 3.4).

Regarding patients' communication, patient participation was evident in 6.6% (M = 19.9) of the coded communication during the consultations, and 3.8% (M = 11.2) referred to verbalized emotional cues. Only 0.2% (M = 0.5) of the utterances were coded as verbalizing difficulties, and 2.7% (M = 7.3) were coded as general affective communication. Tables 3 and 4 give the mean scores of providers' and patients' verbal utterances within each communication category, respectively.

Perceived barriers

To investigate the second research question we first measured patients' perceived barriers, and then we analyzed to what extent those barriers were associated with the communication strategies according to the PPB-typology.

Mean scores on the MUSE ($M_{\text{MUSE-understanding}}$ = 7.17; SD = 2.37; $M_{\text{MUSE use self-efficacy}}$ = 7.25; SD = 1.76) indicated that patients perceived relatively few memory and daily routine barriers. The results also showed that patients reasonably believed in the necessity of the medication ($M_{\text{BMQ-necessity}}$ = 18.51; SD = 3.28) but still had concerns and worries regarding the treatment regimen ($M_{\text{BMQ-concerns}}$ = 17.21; SD = 4.19).

As expected, a significant negative relationship was found between nurses encouraging question-asking behavior and memory barriers, indicating that with more nurse encouragement for the patients to ask questions, fewer memory barriers were perceived by patients ($r = -0.228$, $P = 0.042$). However, other expected relationships between communication strategies and memory barriers were not found.

Unexpectedly, no relationship between perceived daily routine barriers and communication strategies was found.

An unexpected significant negative relationship was found between checking with patients for understanding and perceived necessity barriers, suggesting that the more nurses asked whether the patients understood the medication instructions, the less patients believed that the medication was necessary ($r = -0.276$, $P = 0.013$). However, other expected relationships between communication strategies and necessity barriers were not found.

The use of two recall-promoting techniques, ie, summarizing and using cartoons or pictures during the consultation,

was significantly associated with fewer perceived concern barriers ($r = -0.254$, $P = 0.023$ and $r = -0.249$, $P = 0.026$, respectively). These findings indicate that the more nurses summarized information or used pictures to illustrate the information, the fewer concerns patients had about the medication. Moreover, we found a significant positive relationship between the emotional cues of patients about side effects concerning previous medication and perceived concern barriers, indicating that the more patients expressed worries about side effects based on previous medication use, the more concerns they had regarding the new prescribed medication ($r = 0.244$, $P = 0.029$). An unexpected significant negative relationship was found between involving the patient in the decision-making process and perceived concerns ($r = -0.225$, $P = 0.045$). In other words, patients who were more involved in the decision-making process about their treatment showed more concerns than patients who were less involved. Other expected relationships between communication strategies and concern barriers were not found.

Discussion

In the current study, we developed and tested a new communication typology to promote successful medication intake behavior.

To address the first research question, we found that, in general, the nurses and the patients did not use many of the communication techniques that, according to the PPB-typology, were expected to be related to fewer barriers. A possible explanation may be that the nurses are not aware of the specific barriers that patients perceive, and they are therefore unable to structure their communication accordingly. They may possibly make no distinction between the various barriers. These distinctions are not as straightforward as originally believed.[40] Patients may experience memory and daily routine barriers and necessity and concern barriers simultaneously.[41] It may be rather difficult for nurses to identify which barriers a patient perceives, particularly if the nurses are not trained in the detection of such barriers.

The level of patient participation was found to be high in our sample. This was predominantly due to the high number of questions that patients asked and the high number of emotional cues they expressed. IBD patients verbalized several emotional cues, primarily about their health. We found a mean of 11.2 emotional cues per consultation, compared with a mean ranging from one to seven emotional cues per consultation, which was reported in a literature review by Zimmermann et al.[42] An explanation for this result may be that patients who are starting to use immunosuppressive medication are in an active phase of their disease. Although the introduction of these medications most likely provides patients with a more effective therapy, the medications are also known to show some rare but potentially serious adverse side effects.[35] This issue may have caused a relatively large number of emotional verbalizations. However, the nurses neglected one-third of the emotional cues (eg, by switching the topic of conversation), which has been shown to be an inhibiting response. Moreover, exploring patients' emotional cues, which is recognized in the literature as a facilitative communicative behavior, was only incidentally found.

Furthermore, IBD patients have previously been described as a group of patients who prefer to be actively involved in the decision-making process concerning their treatment.[43] However, in the current study, patients, in general, did not actively participate in the decision-making process. This may be explained by the fact that every IBD treatment has its own possible benefits, risks, and side effects. It may therefore be difficult to implement shared decision-making in the treatment of IBD. This makes the active involvement of patients a challenge[43] and a training goal for further communication skills training. Previous research showed that communication skills training in general affective communication strategies, such as showing interest, listening carefully, taking the patient seriously, and asking questions in a safe atmosphere, resulted in a 19% decrease in nonadherence.[6] A more recent study showed that communication training was successful in enhancing nurses' exploration of patients' medication beliefs and concerns.[44] This effect may increase if nurses learn how they can identify both perceptual and practical barriers to successful medication intake behavior.

To address the second research question, the results showed that when communication strategies were used according to the developed typology, this was associated with fewer barriers. Our findings indicated that when the nurses encouraged patients to ask questions, fewer memory barriers were perceived. Previous research also found that active patient participation and more question-asking resulted in increased recall of information.[22] If patients are encouraged to actively ask questions, they receive opportunities to direct the information flow, which will result in more tailored communication and thus in higher recall.[19] Our findings also showed that the use of the recall-promoting techniques was related to fewer concern barriers. When patients perceive concern barriers, they may have false beliefs about the probability of side effects, which can hinder the proper absorption of adequate information.[16] However, the use of recall-promoting techniques seems to be able to reduce this effect.

Shared decision-making initiated by the nurse was related with fewer concern barriers. This relationship was not expected prior to the study, but, intuitively, it does make sense. When nurses involve patients in the shared decision-making process, the nurses shift away from attempting to encourage patients to take the prescribed medication toward asking questions about how they can contribute to the individual decisions that the patients make.[25] Patients may have individual preferences for taking or not taking the medication as prescribed, and whether the patients have concerns may play a role in this process. For that reason, nurses should acknowledge that patients make decisions based on their individual concerns.[45] Involving patients in the decision-making process allows patients to discuss their concerns, which might ultimately result in consensus and agreement about the treatment, and, consequently, fewer concerns. Although we did not find literature on this relationship when developing the PPB-typology, it seems plausible that decision-making is associated with fewer concern barriers. We believe that these results can contribute to the further refinement of our typology, and these communication strategies will be added to the PPB-typology.

Unexpectedly, we found low mean scores for memory and daily routine barriers, which indicates that patients experience relatively few practical barriers. As a consequence, there was not much variability within these barriers. This may be one of the reasons why we did not find stronger relationships between the use of tailored communication strategies and reduced practical barriers. This could be explained by our sample. Almost 40% of the patients were highly educated, and the majority were relatively young (with a mean age of 40 years). Memory barriers, in particular, may be different in older patients and patients with a lower degree of education. For this reason, it is desirable to replicate this study among older patients and/or patients with a lower degree of education in other patient samples. Moreover, it is plausible that the patients who refused to participate in the study because they were too busy might experience more practical barriers than the patients who participated. This may have contributed to an underestimation of the results.

Limitations

Some limitations of this study should be considered. First, we focused on verbal communication, because this type of communication is still of great importance in medical consultations. However, we did not include nonverbal communication in the scoring system. As shown by the literature review of Hall et al,[46] nonverbal indicators of provider interest are associated with patient satisfaction and indirectly associated with medication intake behavior. Future research on communication strategies to reduce barriers to successful medication intake behavior should include nonverbal measures as well.

A second limitation is that we measured perceived barriers only after the consultation. Therefore, we were not able to measure possible changes over time. This might be an explanation for some findings that were not predicted by the developed typology. For example, checking whether the patient had understood the given information was associated more frequently with necessity barriers. It is possible that although the nurses used this communication technique to decrease those barriers, they might not have been able to remove them successfully. In other words, it is possible that the patients scored relatively high on these barriers after the consultation, but lower than they would have scored before the consultation. Therefore, future research should include premeasurements of perceived barriers regarding medication, which may help to further refine the developed typology.

Conclusions

To conclude, although the PPB-typology provides promising communication recommendations, many of the communication strategies according to the typology were minimally used and should therefore be prioritized in future communication skills training. Interpersonal health communication could be improved by providing training programs to teach health care providers how to identify barriers to successful medication intake behavior, how to adequately respond to emotional cues, how to encourage patient participation, and how to actively involve patients in the decision-making process. The results of this study suggest promising ways to use the PPB-typology in interventions that address patients' barriers by using tailored communication to promote successful medication intake behavior.

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Disclosure

The authors report no conflicts of interest in this work.

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