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ORIGINAL ARTICLE

Complex therapies for advanced Parkinson's disease: what is the role of doctor-patient communication?

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Abstract

Objectives Communication processes play a key role in the patient-doctor relationship. Few studies have considered communicative processes in advanced Parkinson's disease (PD), and in particular in the phase of proposing complex therapies (CT). Therefore, we explored the role of communication and patient-doctor relationship in the transition phase to CT for advanced PD, analysing satisfaction, factors influencing the relationship and patients' unmet needs.

Materials and methods Twenty-four PD patients (mean age 61.7 ± 8.8 years; mean disease duration 12 ± 4.8 years) eligible for deep brain stimulation or infusion therapies were submitted to a semi-structured interview aimed to investigate communication-related cognitions, feelings and behaviours concerning PD and the possible transition towards CT. The Patient-Doctor Relationship Questionnaire (PDRQ-9) was administered along with neuropsychological and behavioural screening tests.

Results All patients discussed the possible transition to CT with a neurologist. A high degree of satisfaction about the relationship with the neurologist was revealed (mean PDRQ-9 score 37.3 ± 7.3). The communication not only aroused feelings of fear (11/24 patients) and concern (15/24 patients), but also fostered the hope for motor improvement (15/24 patients). Half the patients (12/24) wanted to receive more information about CT after communication.

Conclusions This pilot study highlights the importance of doctor-patient communication in PD when facing the transition to CT. Trust in the physician emerged as a key point in favour of the therapeutic alliance. Neurologists should carefully consider patients' reactions and preferences for eliciting collaboration and treatment adherence, favouring a patient-centred standard of care.

Keywords Parkinson's disease · Communication · Advanced phase · Therapies · Deep brain stimulation · Infusion therapies

Introduction

Communication processes play a key role in the patient-doctor relationship, influencing the patient's ability to cope with the situation and cooperate with the physician to optimize medical treatment [1]. The doctor-patient communication is potentially more relevant in the context of chronic neurological disorders, such as the neurodegenerative diseases, when patients and caregivers start a long road together from the diagnosis to the management of progressive symptoms and disabilities. Two main aspects emphasize the significance of doctor-patient communication in Parkinson's disease (PD): the physical, psychological and social implications of the disease [2–4], and the availability of many different therapeutic options to address motor and non-motor features [5–7]. While the early stages of PD are typically characterized by adequate control of motor symptoms by dopaminergic therapy [8–10], the development of therapy-related motor complications [11] often demands the use of more effective albeit invasive therapeutic options. Complex therapies (CT) currently available for PD patients with motor complications encompass deep brain stimulation (DBS), continuous intra-duodenal levodopa/carbidopa intestinal gel infusion (LCIG) and continuous subcutaneous apomorphine infusion (CAI) [12–16]. However, the selection process for CT is challenging and involves doctors, patients and caregivers alike with diverse clinical, human, ethical and cultural implications. Patient motivation, detailed education, regular follow-up visits in a specialized setting and stable patient's support by his environment are considered key elements to improve the clinical outcome

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of CT [12]. These aspects make the CT proposal a sensitive moment in the patients' history, with considerable psychological and decision-making implications for their social and familiar environment [17]. In this context, the patient-doctor relationship is crucial to improve collaboration and adherence to treatment.

To our knowledge, only few studies have examined the role of communication in PD [18], and none specifically investigated the communication processes during the CT evaluation phase. Here, we aimed to investigate the role of doctor-patient communication during the transition to CT, analysing satisfaction, factors influencing the relationship and unmet needs of advanced PD patients.

Materials and methods

Study population

Twenty-four consecutive PD patients were recruited from our Movement Disorder Unit from October 2013 to March 2016. Inclusion criteria were diagnosis of idiopathic PD according to the UK Brain Bank criteria [19], presence of motor fluctuations or dyskinesias despite receiving optimized oral or transdermal medications, and eligibility for CT. Exclusion criteria were diagnosis of dementia, defined by the criteria reported by Emre and coll. [20] and severe depression according to DSM 5 criteria [21].

The Local Ethical Committee approved the study protocol, and each patient signed an informed consent to participate in the study.

Study aims and outcome measures

The primary aim was to analyse the patients' satisfaction with the communication of neurologists on the possibility of switching from standard therapy to CT. As secondary aims, we investigated factors that may influence the patient-doctor relationship and the unmet needs reported by candidates for CT. In addition, we specifically analysed the perceived communicative processes in the sub-group of patients who preferred not to proceed to CT.

Given the lack of validated tools specific for this topic, we developed a semi-structured interview composed of 33 questions and a checklist from which patients ranked the selected items (Table 1). For some questions (item 14, 25, 26), patients were asked to answer selecting from a range score (from 1 to 10), where higher scores were indicative of higher levels of satisfaction and agreement with communication features. Developing the interview, we have taken into account most of the recommendations reported in other studies [22, 23] on how serious illness communication should be delivered. All interviews were performed face-to-face after the patient had discussed with the neurologist about the need to transition to CT. First, socio-demographic information was collected. Then, patients were asked to answer questions about the recent communication received by the neurologist. The interview investigated the following points: (a) setting (time and space); (b) patients' subjective evaluation about disease

Table 1 Semi-structured interview administered to our patients

1) Have you recently had a personal session with a neurologist discussing about your health status and Parkinson's disease?
2) Was the doctor your referral neurologist?
3) Where did doctor-patient communication take place?
4) Do you think that the place was suitable?
5) How much time was dedicated to the personal session?
6) Do you think the time devoted for you was suitable?
7) Who attended the personal session, besides you and the doctor?
8) Would you have preferred having someone else attending the personal session with you?
9) Where people were placed in the room?
10) How did the conversation start?
11) Did the doctor try to establish a contact with you?
12) Did the doctor evaluate your desire to be informed?
13) Referring to the transmitted information:
  13.1) Did the doctor use technical terms?
  13.2) Did the doctor use clear language?
  13.3) Did the doctor give you time for reflections?
  13.4) Did the doctor consider your comprehension?
14) On a range score from 1 to 10, how did you perceive the doctor during the conversation?
  14.1) Emotionally involved
  14.2) Competent from a technical point of view
  14.3) Competent from a relational point of view
15) Which emotions did you perceive by the doctor during the communication?
16) Which emotions and reactions did you feel during the communication?
17) During the days following the communication, did that emotions and reactions change?
18) Which kind of thoughts did the communication favour in you?
19) During the days following the communication, did that thoughts change?
20) What did you do after the communication?
21) What did you do during the days following the communication?
22) During the communication, did the doctor allow you to
  22.1) Express your feelings?
  22.2) Express your thoughts?
  22.3) Express doubts, uncertainties and needs?
  22.4) Express "new" purposes about your health status?
23) How did the communication end, from a practical point of view?
24) How did the communication end, from an emotional point of view?
25) On a range score from 1 to 10, how much did you feel satisfied about the communication with the neurologist?
26) On a range score from 1 to 10, how did you assess physicians' communicative competence?
27) What did you prefer about physicians' way to communicate?
28) What did you dislike about physicians' way to communicate?
29) Did you need further information?
30) Did you need to look for further information (e.g. the Internet, books, friends, other doctors, ...)
31) Did you request further chance to discuss the topic in more detail?
32) With who?
33) Why?

progression; (c) non-verbal communication and subjects' perception about physicians' technical abilities and emotional reactions; (d) reactions, beliefs, behaviours and emotions experienced by participants; (e) conclusion of patient-doctor interaction; (f) exchange of information and information-seeking behaviour. Each interview lasted from 20 to 35 minutes and was transcribed verbatim.

The Patient-Doctor Relationship Questionnaire (PDRQ-9) [24] was used to assess therapeutic aspects of patient-doctor relationship in the care setting. The score ranges from 5 to 45; higher values are indicative of greater satisfaction about the relationship with the physician. Cognitive status was evaluated by means of Mini Mental State Examination (MMSE) [25]. Depressive alterations were investigated using the Beck Depression Inventory II (BDI II) [26], whereas anxiety was assessed by the State-Trait Anxiety Inventory (STAI) X-Form [27].

Statistical analysis

Data were analysed using a mixed method approach aimed to integrate qualitative and quantitative data and their interpretations [28, 29]. Descriptive statistics (mean ± standard deviation) were performed to describe the socio-demographic and clinical characteristics of our sample. Answers to open-ended questions were analysed according to qualitative research design [30]. Collected qualitative data were analysed according to theory-based content analysis [31] useful to quantify the occurrences of concepts selected for examination [32]. This evaluation was carried out by two independent trained coders. Spearman's correlations were used to investigate the relationship between communication processes and levels of anxiety or depression measured by standardized instruments; patient's reactions and their satisfaction for the interaction with the doctor.

All p values reported are two-tailed, and a $p < 0.05$ was considered statistically significant. Data were analysed using the Statistical Package for the Social Sciences (SPSS 22 for Mac, Chicago, IL).

eData availability The datasets generated during and analysed during the current study are not publicly available due to privacy restrictions but are available from the corresponding author on reasonable request.

Results

Sociodemographic and clinical data

We enrolled 24 patients (62.5% males) according to the inclusion/exclusion criteria. Sociodemographic and clinical data of the entire cohort are presented in Table 2.

Table 2 Patients' demographic and clinical features

Age	61.7 (8.8)
Gender (M/F)	15/9
Education (years)	10.5 (3.9)
Disease duration (years)	12 (4.8)
MMSE	28.9 (1.4)
PDRQ-9	37.3 (7.3)
BDI II	12.4 (7.6)
STAI X1	45.4 (13.3)
STAI X2	42.8 (11.1)

Mean (standard deviation) are reported

MMSE, Mini Mental State Examination; *PDRQ-9*, Patient-Doctor Relationship Questionnaire; *BDI II*, Beck Depression Inventory II; *STAI X1*, State-Trait Anxiety Inventory X Form (state anxiety); *STAI X2*, State-Trait Anxiety Inventory X Form (trait anxiety)

Communication about CT was given by 12 neurologists from 6 Italian regions.

Patients' satisfaction with the communication

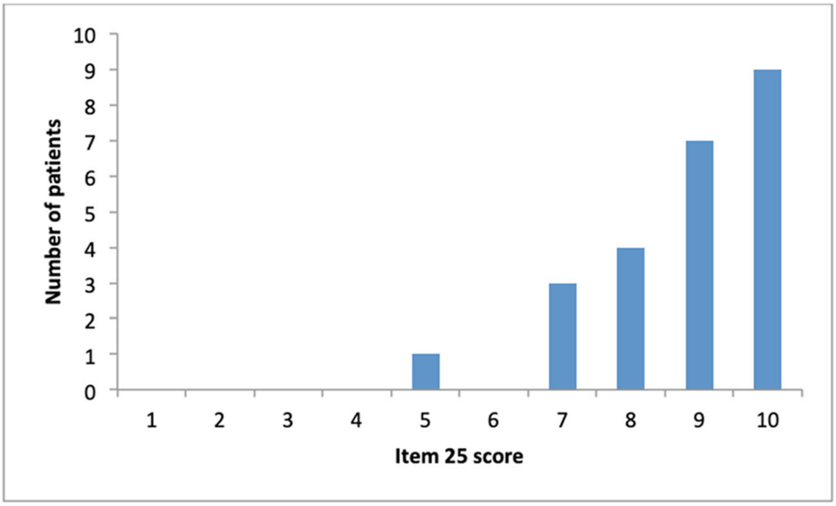
In our sample, high satisfaction for patient-doctor interaction was outlined, as emerged by item 25 of the interview (mean score = 8.79 ± 1.31; range 7–10): on a range score from 1 to 10, 83.3% of patients ($n = 20/24$) assigned a score ≥ 8 (Fig. 1). The PDRQ-9 score confirmed a high satisfaction for the patient-doctor relationship, showing a mean score of 37.3 ± 7.3 (range 17–45).

The physicians' communicative competence was evaluated as very adequate (item 26: mean score = 9.08 ± 1.21; range 5–10). Patients perceived the doctor as emotionally involved (item 14.1: mean score = 8.5 ± 1.2; range 6–10) and competent from a technical (item 14.2: mean score = 9.3 ± 0.9; range 7–10) and relational (item 14.3: mean score = 9 ± 1; range 7–10) point of view. In addition, as evaluated by item 15, a sense of responsibility of the physician was perceived by 91.7% of subjects ($n = 22/24$). Among the emotions expressed by the physician and perceived by the patient, sadness was reported by 16.7% ($n = 4/24$), and sense of impotence by 12.5% ($n = 3/24$). None of the respondents perceived negative feelings from the physician, such as anger, sense of guilt, embarrassment or desire to avoid the situation.

When questioned about the most appreciated aspects of doctor's communication (item 27), directness and clarity were the most frequently cited adjectives, as referred by 29.2% ($n = 7/24$) of participants (Fig. 2). As assessed by item 11, non-verbal means of communication, such as eye contact and gestures, played a key role during communicative processes and were interpreted as doctor's signal of interest and empathy, as stated by 37.5% ($n = 9/24$) of patients.

Considering the setting dedicated to communication (from item 3 to item 9), all except one patient evaluated

Fig. 1 Satisfaction for patient-doctor interaction on a range score from 1 to 10 evaluated by item 25 of the interview



communication setting as suitable. As estimated by respondents, patient-doctor interactions had a mean duration of 40.8 ± 15.9 minutes, rated as appropriate by 83.3% of subjects ($n = 20/24$). Only 3 patients (12.5%) preferred not to be accompanied by a family member during the visit.

A significant and inverse correlation was found between satisfaction for patient-doctor interaction and patients' reactions of anger and scepticism (item 22) (anger $r = -0.52$, $p < 0.05$; scepticism $r = -0.52$, $p < 0.05$). Patients' reactions of sadness and shock (item 22) were inversely correlated with PDRQ-9 score (sadness $r = -0.49$, $p < 0.05$; shock $r = -0.43$, $p < 0.05$) (Table 3).

Factors influencing the patient-doctor relationship

Referring to factors that may have contributed to patients' satisfaction, all participants had a personal session with a neurologist discussing the possible transition to CT during an outpatient visit (item 1 of the interview). In 62.5% of cases ($n = 15/24$), this communication was delivered by the referral neurologist.

As evaluated by item 12 and 13, the vast majority of patients (91.7%; $n = 22/24$) reported that neurologists correctly took into account the desire to be informed about CT. Despite the use of technical words (as reported by 66.7% of participants; $n = 16/24$), a clear language was used, and careful attention was paid to patient's comprehension of the referred content in 100% of cases ($n = 24/24$). Time to reflect on emerging themes was defined as adequate by 91.7% of patients ($n = 22/24$). As estimated by item 22 of the interview, 100% of patients ($n = 24/24$) reported having had the possibility to express emotions, thoughts, doubts and questions. In addition, all participants felt the possibility to discuss with physicians about a possible new strategy or treatment

Fig. 2 Most appreciated features of doctor's communication reported as percentage. Patients' answers referred by less than 10% of respondents are reported as "other". This category includes the following answers: 1 = authority; 2 = nothing; 3 = gladness; 4 = availability; 5 = expertise; 6 = loosening; 7 = familiar attitude; 8 = smile; 9 = care for patient; 10 = practicality/concreteness; 11 = simplicity/humility

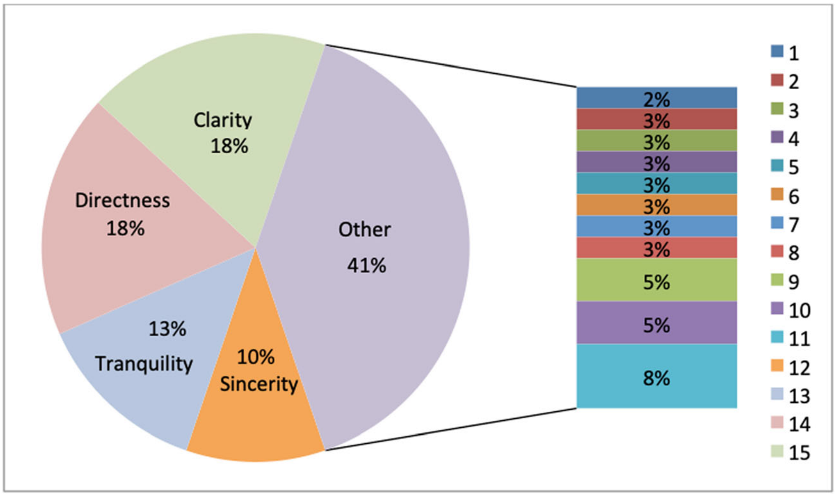


Table 3 Spearman's correlations between emotional reactions and BDI II, STAI X Form scores, PDRQ-9 score and item 25 of the interview score

Emotional reaction	*N* (%)	BDI II	STAI X1	STAI X2	PDRQ-9	Satisfaction for patient-doctor interaction (item 25)
Cry	7 (29.2)	0.35	0.10	0.02	0.15	− 0.18
Anger	4 (16.7)	0.22	0.40	0.40	− 0.38	− 0.52*
Sadness	6 (25)	0.41	0.63*	0.52*	− 0.49*	− 0.33
Silence	6 (25)	0.36	0.41	0.28	− 0.28	− 0.10
Denial	1 (4.2)	0.36	0.40	0.40	− 0.35	− 0.36
Shock	5 (20.8)	0.10	0.26	0.26	− 0.43*	− 0.36
Scepticism	4 (16.7)	0.37	0.55*	0.48*	− 0.38	− 0.52*
Concern	15 (62.5)	0.61*	0.24	0.25	− 0.03	− 0.30
Fear	11 (45.8)	0.25	0.31	0.01	− 0.16	− 0.15
Hope	15 (62.5)	− 0.45	− 0.49*	− 0.30	0.32	0.34
Gladness	10 (41.7)	− 0.32	− 0.22	− 0.25	− 0.09	0.19

*Significant correlations ($p < 0.05$)

BDI II, Beck Depression Inventory II; *STAI X1*, State-Trait Anxiety Inventory X Form (state anxiety); *STAI X2*, State-Trait Anxiety Inventory X Form (trait anxiety); *PDRQ-9*, Patient-Doctor Relationship Questionnaire

plan for their health status. In fact, concluding this personal session, in 45.8% of cases ($n = 11/24$), patient and neurologist arranged assessments necessary for the selection of CT (item 23).

Patients' unmet needs

In spite of high satisfaction for the patient-doctor interaction, some unmet needs emerged from the patients' perspective. Considering answers collected from item 29 to item 33 of the interview, 50% of patients ($n = 12/24$) wished to receive further information and only 7 patients (29.2%, $n = 7/24$) did not attempt to obtain further explanations. Use of the Internet to gather more information was very frequent (50% of respondents, $n = 12/24$).

As evaluated by item 22 (Table 2), this communication aroused a wide range of beliefs and related emotional contents encompassing, in particular, fear (45.8%, $n = 11/24$ patients) and concern (62.5%, $n = 15/24$ patients). A significant correlation was found between anxiety measures and emotions like sadness (STAI X1 $r = 0.63$, $p < 0.01$; STAI X2 $r = 0.52$, $p < 0.05$) and scepticism (STAI X1 $r = 0.55$, $p < 0.05$; STAI X2 $r = 0.48$, $p < 0.05$), whereas feelings of concern significantly correlated with depressive symptoms (BDI II $r = 0.61$, $p < 0.05$).

Therapeutic choice

After the communication, 62.5% of patients ($n = 15/24$) started a CT, while 37.5% ($n = 9/24$) continued with standard pharmacological treatment (Fig. 3). Out of 15 patients treated with CT, 60% ($n = 9/15$) underwent DBS, whereas 40% ($n = 6/15$) began a treatment with LCIG. Among the 9 patients who did not start a CT, 44.4% of subjects ($n = 4/9$) referred to DBS were not eligible (3 patients because of cerebral atrophy and cognitive deficit; one patient was under evaluation for borderline cognitive status), while 55.6% of patients ($n = 5/9$) refused CT for excessive anxiety or poor motivation.

Referring to this last subgroup of respondents, patients' satisfaction about the relationship with physicians, assessed by PDRQ-9, was still high (mean score = 35 ± 11.81; range 17–45). On a range score from 1 to 10, patients perceived the doctor as emotionally involved (item 14.1: mean score = 8.4 ± 1.5; range 7–10) and competent from a technical (item 14.2: mean score = 8.8 ± 1.3; range 7–10) and relational (item 14.3: mean score = 9 ± 1.2; range 7–10) point of view. In addition, as assessed by item 15, a sense of responsibility by the physician was perceived by 80% of patients ($n = 4/5$). From the patients' perspective, emotional reactions of cry and feelings of fear and concern were reported by 60% of respondents ($n = 3/5$); 40% of subjects ($n = 2/5$) reported hope for motor improvement. At the end of the personal session, patients reported satisfaction for the interaction with neurologists (item 25: mean score = 8 ± 2.1; range 5–10). Nevertheless, 60% of patients ($n = 3/5$) sought for more information about CT (i.e. the Internet).

Discussion

The aim of our exploratory study was to investigate the role of communication and patient-doctor relationship in the possible transition to CT for the treatment of advanced PD. First of all, our patients reported a high degree of satisfaction with their relationship with clinicians. Concerning the main themes explored by our interview, all respondents discussed the transition to CT with the neurologist that, in most cases, was the referral physician. This result differs from the one literature

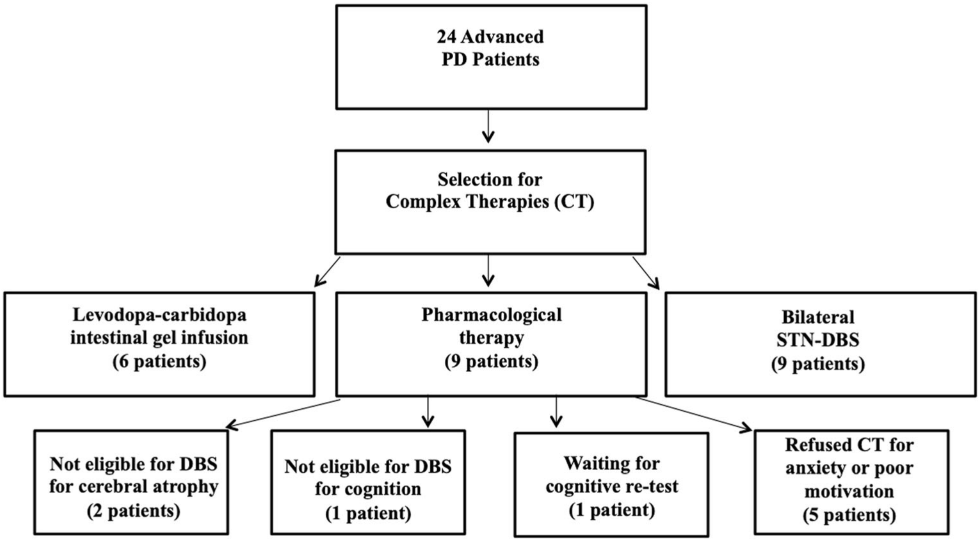


Fig. 3 Flowchart of the therapeutic choice of the patients

report [18], where the most important information channels about CT were magazines, other patients, television and the Internet. From the patient's perspective, receiving serious illness communication from the treating neurologist could be beneficial for several reasons. Trust in the physician and therapeutic alliance, that may have been built previously, could help patients to better understand conveyed messages and to have a more constructive reaction. We believe that this point may play a central role for optimal care and satisfaction about the current and future treatments.

In addition, these aspects may have contributed to patients' awareness about disease progression and symptoms worsening, a crucial point to be evaluated at the beginning of serious illness communication, where the physician should explore patient's knowledge and expectations about the disease and, therefore, readiness to hear delicate or bad news.

Other critical points regarding communication were the setting dedicated to the discussion that in our sample was evaluated as suitable by the overall majority of patients and the possibility for patients to be accompanied throughout the process by a family member. Good family and social support is essential for PD patients, particularly in advanced stages of the disease. Indeed, caregiver's involvement represents a fundamental aspect in all phases of CT [13] and can play a key role in patients' decision making [33]. Moreover, in the absence of an adequate social and familiar support, infusional therapies are not recommended [13, 34].

Other interesting results are derived from questions linked to patients' theory of mind, defined as the ability to infer and predict the intentions, thoughts, desires, intuitions, behavioural reactions, plans and beliefs of other people [35]. This ability requires awareness that others have a mind with mental states, information and motivations that may differ from one's own [36, 37]. About physicians' emotions experienced during serious illness communication, none of the patients perceived negative feelings, while a sense of responsibility was frequently perceived. This perception may favour the patients' trust in the neurologist and the proposed treatment; probably physicians are viewed as a source of authority and their advice on therapy and symptoms are considered meaningful. In fact, physicians were perceived as competent from a technical and relational point of view. Moreover, neurologists were defined as emotionally involved during communicative processes described as rich of non-verbal means of communication, such as eye contact and gestures. These features of communicative processes may have played a central role in considering the physician as empathetic and interested in patients' health status.

The knowledge of patients' experience will allow clinicians to more effectively respond to patients' emotional reactions, thereby facilitating the delivery of life-altering news and creating an experience as positive as possible. Our results highlight that communication can trigger a wide range of thoughts and related emotions in PD patients referred for CT, that the neurologists should take into account. As expected, negative feelings, such as fear and concern, were frequently reported, probably elicited by the confirmation of symptoms worsening and the suggestion to undergo an invasive procedure. However, also feelings of gladness and hope for motor improvement were reported, probably elicited by physician's opinion and trust about the possibility of a new effective therapy.

According to respondents' opinions, physicians seemed to deliver bad news related to the transition to CT adequately, respecting the recommendations and protocols described elsewhere [22, 38]. However, some aspects of communicative processes should be further improved. For example, after the discussion with physicians, search for further information was very frequent. Information seeking could be a precious coping strategy that physician should recognize in order to favour decision-making processes. The use of written material or the possibility to conduct the discussion in more encounters could be a more constructive strategy.

Concerning patients that refused CT, we may suppose some weaknesses of the communicative process. For example, managing fear and concern may be difficult, related in part to the doctor's ability to recognize and denominate these emotions, in order to favour cognitive and emotional processing. Another issue is linked to the meaning that the patient attributes to the symptoms and their potential improvement. Indeed, during communication, patients can develop relevant misconceptions that may negatively affect decision-making processes [39].

To our knowledge, this is the first study evaluating the role of communicative processes and patient-doctor relationship in the possible transition to CT for the treatment of advanced PD. The small number of cases represents the main shortcoming of the study, limiting the analysis of the results to descriptive statistics. A second limitation, which could affect the generalization of our results, is the fact that all patients pertain to the same cultural context (i.e. Italian population). This data might influence reactions and emotional traits, eventually influencing the interaction with doctors. Thus, further studies are recommended to confirm the consistency of our findings also in other cultural areas. Finally, we relied on data collected by one investigator, but related to the communication of patients with different neurologists ($n = 12$), introducing a possible bias due to a high variability of data.

In conclusion, trust in the physician and the possibility to receive serious illness communication news from referral neurologist resulted as the core element in favour of a positive patient-doctor relationship. During this communicative process, physicians should carefully recognize patients' emotional reactions and preferences to elicit collaboration and treatment adherence, favouring a patient-centred treatment. Studies focusing on the best way to communicate important information during the course of PD are needed to improve the patients' care.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical standards This study has been approved by the local ethical committee and performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

References

1. Travaline JM, Ruchinskas R, D'Alonzo GE (2005) Patient-Physician Communication: Why and How. JAOA Clinical Practice 105(1):13–18
2. Poewe W, Mahlknecht P (2009) The clinical progression of Parkinson's disease. Parkinsonism Relat Disord 15(Suppl 4):S28–S32. https://doi.org/10.1016/S1353-8020(09)70831-4
3. Macleod AD, Counsell CE (2016) Predictors of functional dependency in Parkinson's disease. Mov Disord 31(10):1482–1488. https://doi.org/10.1002/mds.26751
4. Prakasha KM, Nadkarnid NV, Lyed WK, Yonga MH, Tana EK (2016) The impact of non-motor symptoms on the quality of life of Parkinson's disease patients: a longitudinal study. Eur J Neurol 23(5):854–860. https://doi.org/10.1111/ene.12950
5. Krack P, Batir A, Van Blercom N et al (2003) Five-year follow-up of bilateral stimulation of the subthalamic nucleus in advanced Parkinson's disease. N Engl J Med 349(20):1925–1934
6. Olanow CW, Kieburtz K, Odin P et al (2014) Continuous intrajejunal infusion of levodopa-carbidopa intestinal gel for patients with advanced Parkinson's disease: a randomised, controlled, doubleblind, double-dummy study. Lancet Neurol 13(2):141–149. https://doi.org/10.1016/S1474-4422(13)70293-X
7. Katzenschlager R, Poewe W, Rascol O, Trenkwalder C, Deuschl G, Chaudhuri KR, Henriksen T, van Laar T, Spivey K, Vel S, Staines H, Lees A (2018) Apomorphine subcutaneous infusion in patients with Parkinson's disease with persistent motor fluctuations (TOLEDO): a multicentre, double-blind, randomised, placebo-controlled trial. Lancet Neurol 17(9):749–759. https://doi.org/10.1016/S1474-4422(18)30239-4
8. Fahn S, Oakes D, Shoulson I, Kieburtz K, Rudolph A, Lang A et al (2004) Levodopa and the progression of Parkinson's disease. N Engl J Med 351(24):2498–2508
9. Fox SH, Katzenschlager R, Lim SY, Ravina B, Seppi K, Coelho M (2011) The Movement Disorder Society evidence-based medicine review update: treatments for the motor symptoms of Parkinson's disease. Mov Disord 26(Suppl 3):S2–S41. https://doi.org/10.1002/mds.23829
10. Morgan JC, Fox SH (2016) Treating the Motor Symptoms of Parkinson Disease. Continuum (Minneap Minn) 22(4 Movement Disorders):1064–1085. https://doi.org/10.1212/CON.0000000000000355
11. Coelho M, Ferreira JJ (2012) Late-stage Parkinson disease. Nat Rev Neurol 8(8):435–442. https://doi.org/10.1038/nrneurol.2012.126
12. Ossig C, Reichmann H (2013) Treatment of Parkinson's disease in the advanced stage. J Neural Transm 120(4):523–529. https://doi.org/10.1007/s00702-013-1008-y
13. Krüger R, Hilker R, Winkler C, Lorrain M, Hahne M, Redecker C (2016) Advanced stages of PD: interventional therapies and related patient-centered care. J Neural Transm 123(1):31–43. https://doi.org/10.1007/s00702-015-1418-0
14. Weaver FM, Follett K, Stern M, Hur K, Harris C, Marks WJ (2009) Bilateral deep brain stimulation vs best medical therapy for patients with advanced Parkinson disease: a randomized controlled trial. JAMA 301(1):63–73. https://doi.org/10.1001/jama.2008.929
15. Xie CL, Shao B, Chen J, Zhou Y, Lin SY (2016) Effects of neurostimulation for advanced Parkinson's disease patients on motor symptoms: A multiple-treatments meta-analysis of randomized controlled trials. Sci Rep 6:25285. https://doi.org/10.1038/srep25285
16. Wirdefelt K, Odin P, Nyholm D (2016) Levodopa–Carbidopa Intestinal Gel in Patients with Parkinson's Disease: A Systematic Review. CNS Drugs 30(5):381–404. https://doi.org/10.1007/s40263-016-0336-5
17. Hamberg K, Hariz G (2014) The decision-making process leading to deep brain stimulation in men and women with Parkinson's disease – an interview study. BMC Neurol 14:89. https://doi.org/10.1186/1471-2377-14-89
18. Lökk J (2011) Lack of information and access to advanced treatment for Parkinson's disease patients. J Multidiscip Healthc 4:433–439. https://doi.org/10.2147/JMDH.S27180
19. Hughes AJ, Ben-Shlomo Y, Daniel SE, Lees AJ (1992) What features improve the accuracy of clinical diagnosis in Parkinson's disease: a clinicopathologic study. Neurology 42(6):1142–1146

20. Emre M, Aarsland D, Brown R, Burn DJ, Duyckaerts C, Mizuno Y, Broe GA, Cummings J, Dickson DW, Gauthier S, Goldman J, Goetz C, Korczyn A, Lees A, Levy R, Litvan I, McKeith I, Olanow W, Poewe W, Quinn N, Sampaio C, Tolosa E, Dubois B (2007) Clinical diagnostic criteria for dementia associated with Parkinson's disease. Mov Disord 22(12):1689–1707
21. American Psychiatric Association (2013) Diagnostic and statistical manual of mental disorders, 5th edn. Arlington, VA
22. Fallowfield L, Jenkins V (2004) Communicating sad, bad, and difficult news in medicine. Lancet 363(9405):312–319
23. Baile WF, Buckman R, Lenzi R, Glober G, Beale EA, Andrzej AP (2000) SPIKES-A Six-Step Protocol for Delivering Bad News: Application to the Patient with Cancer. Oncologist 5(4):302–311
24. Van der Feltz-Cornelis CM, Van Oppen P, Van Marwijk HWJ, De Beurs E, Van Dick R (2004) A patient-doctor relationship questionnaire (PDRQ-9) in primary care: development and psychometric evaluation. Gen Hosp Psychiatry 26(2):115–120
25. Folstein MF, Folstein SE, McHugh PR (1975) "Mini-Mental State": A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res 12(3):189–198
26. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J (1961) An inventory for measuring depression. Arch Gen Psychiatry 4:561–571
27. Spielberger CD, Gorsuch RL, Lushene PR, Vagg PR, Jacobs GA (1983) Manual for the State-Trait Anxiety Inventory. Consulting Psychologists Press, Palo Alto
28. Tashakkori A, Teddlie C (2003) Handbook of Mixed Methods in Social & Behavioral Research. Sage, Thousand Oaks
29. Creswell JW, Plano Clark VL (2011) Designing and conducting mixed methods research. Sage, Thousand Oaks
30. Lincoln YS, Guba EG (1985) Naturalistic Inquiry. Sage Publications Ltd, London
31. Mayring P (2000) Qualitative content analysis. Forum Qual Soc Res
32. Wilkinson D, Birmingham P (2003) Using Research Instruments: A guide for researchers. Routledge, Falmer
33. Kim M, Yun JY, Jeon B, Lim YH, Kim K, Yang H et al (2016) Patients' reluctance to undergo deep brain stimulation for Parkinson's disease. Parkinsonism Relat Disord 23:91–94. https://doi.org/10.1016/j.parkreldis.2015.11.010
34. Abbruzzese G, Barone P, Bonuccelli U, Lopiano L, Antonini A (2012) Continuous intestinal infusion of levodopa/carbidopa in advanced Parkinson's disease: efficacy, safety and patient selection. Funct Neurol 27(3):147–154
35. Frith CD, Frith U (2011) Mechanisms of social cognition. Annu Rev Psychol 63:287–313. https://doi.org/10.1146/annurev-psych-120710-100449
36. Korkmaz B (2011) Theory of mind and neurodevelopmental disorders of childhood. Pediatr Res 69(5 Pt 2):101R–108R. https://doi.org/10.1203/PDR.0b013e318212c177
37. Sabbagh MA (2004) Understanding orbitofrontal contributions to theory-of-mind reasoning: implications for autism. Brain Cogn 55(1):209–219
38. Back A, Arnold RM, Tulsky JA (2009) Mastering Communication with Seriously Ill Patients: Balancing Honesty with Empathy and Hope. Cambridge University Press, New York
39. Nijhuis FA, van Heek J, Bloem BR, Post B, Faber MJ (2016) Choosing an Advanced Therapy in Parkinson's Disease; is it an Evidence-Based Decision in Current Practice? J Park Dis 6(3): 533–543. https://doi.org/10.3233/JPD-160816