HHS Public Access

Author manuscript

Patient Educ Couns. Author manuscript; available in PMC 2020 September 01.

Published in final edited form as:

Patient Educ Couns. 2019 September ; 102(9): 1636–1643. doi:10.1016/j.pec.2019.04.012.

Characterizing Patient-Clinician Chemotherapy-Induced Peripheral Neuropathy Assessment and Management Communication Approaches

Robert Knoerl, PhD, RN[1], **Ellen M. L. Smith, PhD, APRN, AOCN®, FAAN**[2], **Amy Han, MPH**[3], **Allison Doe, BSN**[4], **Katelyn Scott, BSN**[5], **Donna L. Berry, PhD, RN, AOCN, FAAN**[6]

[1]Post-Doctoral Research Fellow, Phyllis F. Cantor Center for Research in Nursing and Patient Care Services, Dana Farber Cancer Institute, 450 Brookline Avenue, LW 517, Boston, MA 02215, USA

[2]Associate Professor, School of Nursing, University of Michigan 400 N. Ingalls, Ann Arbor, MI 48109, USA

[3]Research Assistant, Phyllis F. Cantor Center for Research in Nursing and Patient Care Services, Dana Farber Cancer Institute, 450 Brookline Avenue, LG 1B, Boston, MA 02215, USA

[4]Research Assistant, Phyllis F. Cantor Center for Research in Nursing and Patient Care Services, Dana Farber Cancer Institute, 450 Brookline Avenue, LW 515A, Boston, MA 02215, USA

[5]Research Assistant, Phyllis F. Cantor Center for Research in Nursing and Patient Care Services, Dana Farber Cancer Institute, 450 Brookline Avenue, LW 517, Boston, MA 02215, USA

[6]Nurse Scientist, Phyllis F. Cantor Center for Research in Nursing and Patient Care Services, Dana-Farber Cancer Institute, 450 Brookline Avenue, LW 518, Boston, MA 02215, USA

Abstract

Objective: To describe the frequency and characteristics of chemotherapy-induced peripheral neuropathy (CIPN) assessment and management communication approaches between patients receiving neurotoxic chemotherapy and clinicians.

Methods: The data used in this analysis originated from a randomized controlled trial in which adults with cancer self-reported treatment-related symptoms using web-based symptom assessment technology. Three-to-six weeks after study initiation, each participant's outpatient visit was audio-recorded. Audio recordings and associated clinician notes for 159 participants who

Corresponding Author: robert_knoerl@dfci.harvard.edu;, Phone: 617-632-6386.

Declaration of Interest: Dr. Knoerl reports a consulting honorarium from System Analytic. All authors have approved the final article.

Informed Consent and Patient Details: I confirm all patient/personal identifiers have been removed or disguised so the patient/person(s) described are not identifiable and cannot be identified through the details of the story

received platinum and/or taxane-based chemotherapy were coded for the presence of several CIPN assessment and management communication characteristics.

Results: Participants received low cumulative neurotoxic chemotherapy doses (75%) at the time of audio recording. CIPN was discussed and documented in 44% and 46% of participant-clinician encounters. In symptomatic participants, clinicians asked an average of 0.7 open-ended questions, appropriately managed 70% of cases, and asked upper and lower extremity CIPN questions in 25% of cases.

Conclusions: Clinicians infrequently discussed and documented CIPN in participants with low CIPN severity, however appropriately managed mild CIPN. Development of interventions to translate existing recommended CIPN communication approaches into practice are required.

Practice Implications: Effective participant-clinician communication is required at each clinic visit during chemotherapy treatment to identify initial signs of CIPN and offer appropriate treatment.

Keywords

Peripheral Nervous System Diseases/Chemically-Induced; Chemotherapy-Induced Peripheral Neuropathy; Symptom Assessment; Communication

1. Introduction

Approximately 650,000 individuals receive chemotherapy treatment in the United States each year [1] and many will experience side effects (e.g., pain, fatigue, nausea) that compromise physical function and quality of life [2,3]. A common toxicity of neurotoxic chemotherapy treatment (e.g., platinums and taxanes), chemotherapy-induced peripheral neuropathy (CIPN) is mainly characterized by sensory (e.g., numbness, tingling, and neuropathic pain) and motor (e.g., loss of strength) symptoms in the upper and lower extremities [4]. Unmanaged CIPN may lead to increased health care costs, the inability to complete daily activities, and the withdrawal of life-saving chemotherapy [5–8].

To prevent or reduce the negative outcomes attributed to unmanaged CIPN, early CIPN identification is critical. To detect and treat early symptoms of neuropathy, CIPN assessment should occur prior to the initiation of neurotoxic chemotherapy to establish a baseline; and subsequently at every clinic visit while the patient is receiving treatment [5]. Clinicians should evaluate CIPN incidence, severity, type (non-painful, painful, motor), and symptom patterns [9]. For example, clinicians may ask patients to describe sensory symptoms such as numbness, tingling, or pain in their hands or feet [10]. Clinicians should also ask about falls, trouble conducting fine motor activities, or problems walking; these are common manifestations of motor CIPN [10]. Further, CIPN assessment may include the administration of patient reported outcome measures or clinician-based assessment methods (e.g., vibration sensibility, deep tendon reflexes, strength) [5,11]. However, current evidence suggests that CIPN is inadequately assessed in practice [12–15]. Specifically, pre-intervention documentation of CIPN-related numbness, tingling, and pain in individuals receiving neurotoxic chemotherapy or post treatment was present in less than 60% of reviewed clinician' notes, respectively (N=48) [16]. Barriers hindering optimal CIPN

assessment in clinical practice include patient difficulty describing sensory CIPN symptoms [17,18] and a lack of “gold-standard” CIPN assessment measures [19] or guidelines [20].

Several studies demonstrate the importance of effective patient-clinician symptom communication on patient outcomes [21–24]. An important step to address CIPN assessment barriers and move toward the development of standardized assessment approaches is to critically assess patient-clinician CIPN communication patterns. For instance, are clinicians using vague terms to describe CIPN (e.g., how’s the neuropathy?) or not asking patients about various aspects of the CIPN symptom experience (e.g., numbness, tingling, pain, or motor impairment)? Also, are clinicians implementing patient-centered communication approaches during CIPN discussions [24,25]? Constand, MacDermid, Dal Bello-Haas, and Law (2014) [25] outlined a few key aspects of patient-centered communication such as: 1) sharing information, 2) compassionate care, and 3) sensitivity to patient needs. Briefly, sharing information entails effective distribution of health care information between patients and clinicians (e.g., use of open-ended questions, goal setting). Compassionate care and sensitivity to patient needs refer to the ability of the clinician to be attentive to the patient’s symptom self-report and aware of patient cues that may signal suboptimal information receptivity (e.g., hearing loss, impact of family members in the room) to promote autonomy and trust in the patient-clinician relationship.

A greater understanding of patient-clinician CIPN communication approaches may allow for the development of interventions to foster the early identification and subsequent management of CIPN. To date, little is currently known about how patients and clinicians discuss CIPN during routine oncology outpatient visits. Thus, the purpose of this analysis was to describe the frequency and characteristics of CIPN assessment and management communication approaches between outpatients receiving neurotoxic chemotherapy and their clinicians.

2. Methods

2.1 Design, Sample, Setting

Analyzed data were drawn from a sample of adults (≥18 years of age, ambulatory, English speaking) beginning cancer treatment (e.g., chemotherapy or radiation) who consented to participate in a randomized controlled trial testing the efficacy of a web-based symptom assessment and self-care platform (ESRA-C) to improve symptom distress [26]. Participants were included in this cross-sectional analysis if they received neurotoxic chemotherapy (i.e., platinum or taxane-based) and had an audio recorded clinic visit on file. 275 clinicians (i.e., physicians, nurse practitioners, physician assistants, or nurses) providing care to patients enrolled in the trial were consented in the original trial. This study was conducted at two comprehensive cancer centers in Seattle and Boston. The study was approved and regulated by the Institutional Review Boards at each site and written informed consent was obtained from all participants.

2.2 Measures

2.21 CIPN discussion/assessment and management frequency.—Audio files were coded for the following CIPN assessment characteristics: 1) CIPN discussion initiator, 2) the number of closed and open-ended CIPN assessment questions, 3) participant report of CIPN, 4) clinician inquiry regarding non-painful and painful CIPN severity (e.g., 0 – 10 scale, subjective questions), 5) clinician inquiry regarding concurrent motor CIPN symptoms (e.g., cramps, loss of strength, trouble climbing stairs), 6) clinician inquiry regarding CIPN symptom pattern (e.g., onset, location, alleviating factors), 7) clinician response to discussion of CIPN (i.e., acknowledge, acknowledge and explore, dismiss), and 8) description of CIPN assessment questions posed by clinicians. Audio files were also reviewed and coded for the following CIPN management characteristics: 1) appropriate management based on the participant's reported CIPN symptoms, 2) type of CIPN management intervention, 3) education and/or monitoring plan for CIPN, and 4) clinician verification of management plan with participant. This data collection form was adapted from a previous version used to code participant-clinician discussions of pain severity [27].

2.22 Criteria for appropriate CIPN management (Appendix A – 2).—We used a scoring sheet to determine if clinicians provided appropriate management for participants reporting CIPN. Our scoring sheet listed criteria for appropriate management of painful [28], non-painful [29], and motor CIPN [30,31]. For example, if the participant reported painful CIPN, we considered clinicians to have appropriately managed painful CIPN if they: 1) prescribed duloxetine 60 mg/day [28,29], 2) referred the participant for non-pharmacological treatment, 3) prescribed a second line analgesic/adjuvant drug treatment [29], 4) prescribed a neurotoxic chemotherapy dose reduction, or 5) encouraged participants to continue to monitor their symptoms (for minimal painful CIPN only). Conversely, the clinician was deemed to have inappropriately managed CIPN if they: 1) prescribed a pharmacological or non-pharmacological treatment with little demonstrated efficacy, 2) did not discuss any management options with a symptomatic participant and their documentation stated that the participant did not have CIPN, 3) did not offer a recommended treatment to participants who reported worsening sensory CIPN or motor impairment due to CIPN, or 4) dismissed participants' report of CIPN and did not discuss a management or monitoring plan. Lastly, if the participant reported minimal CIPN (e.g., transient cold-induced neuropathy) and the management plan did not meet any of the criteria for inappropriate management, the case was rated as appropriate management.

2.23 Electronic medical record CIPN coding sheet.—To gain additional information regarding participant-clinician communication of CIPN, clinician documentation was abstracted from the electronic medical record. The extracted data included: 1) clinician documentation of CIPN assessment (e.g., numbness, tingling, and/or pain), 2) clinician documentation of CIPN management, 3) the type, dose, and duration of neurotoxic chemotherapy received, 4) pain medications, and 5) documented indicators that participants' CIPN was unexpected given the number of neurotoxic chemotherapy cycles received, or 6) other concurrent severe symptoms that may have distracted from CIPN assessment.

2.24 European Organisation for Research and Treatment of Cancer Quality of Life CIPN20 (QLQ-CIPN20).—The QLQ-CIPN20 was used in the primary randomized controlled trial as a CIPN screening measure. The measure contains three subscales assessing symptoms and functional limitations related to sensory, motor, and autonomic neuropathy. Each item is scored on a 1 – 4 scale, with total transformed scores ranging from 0 – 100 (higher scores represent worse neuropathy) [32]. We only report on the sensory and motor subscales in this analysis due to the suboptimal reliability and validity of the autonomic subscale [33]. Several studies support the sensory and motor subscales' reliability and validity [19,33]. High intraclass correlations (*Range* > 0.91) suggest excellent mode equivalence when comparing electronic to paper/pencil versions of the QLQ-CIPN20 sensory and motor subscales [34].

2.3 Procedures

The procedures of the randomized controlled trial and audio recording [26,35] have been previously described. To recap, enrolled individuals were randomized in a 1:1 ratio to receive web-based symptom assessment and self-care platform (ESRA-C) or web-based symptom assessment alone (control). Participants electronically reported cancer treatment-related symptoms (e.g., QLQ-CIPN20) around the time chemotherapy treatment commenced (T1), three to six weeks after T1 (T2), two to four weeks after T2 (T3), and two to four weeks after the completion of treatment (T4). Following electronic symptom reporting, clinicians received a graphed summary of questionnaire scores for patient participants in both groups prior to each clinic visit. Intervention group participants also received additional self-care resources for cancer treatment-related symptoms reported at pre-determined threshold scores (e.g., QLQ-CIPN20 subscale scores ≥ 50), which included instruction on how to communicate problematic symptoms to the clinical team, information about cancer treatment-related symptom severity progression over time, tailored self-care instructions about problematic symptoms, and access to report cancer related symptoms via the web-based symptom assessment technology at home. Control group participants received standard education about cancer related symptoms from clinicians.

At the regularly scheduled T2 clinic visit, the participant-clinician interaction was audio-recorded. Following the recording, study team members from the original study coded the audio file for the presence of cancer treatment-related symptom discussions [35]. Study team members from the original study were trained in the coding procedures and had to complete eight test cases prior to coding study participants' audio files. A subset (12%) of cases were randomly reviewed for agreement among reviewers (mean percent agreement between coders = 86.7) [35]. For the current analysis, the coders/authors (AH, AD, and KS) were trained by RK in how to score the audio and electronic medical record data collection sheets. Two authors (RK and AH) independently listened to the audio recordings that were originally coded for the presence of participant-clinician CIPN discussions. In addition, AD and KS independently reviewed the electronic medical record notes associated with each T2 audio recording. All audio and electronic medical record data collection sheet scores were reviewed between the coders and any coding discrepancies were documented in an excel sheet. All coding discrepancies were discussed among the authors and a final code was decided upon. Information abstracted from the electronic medical record was used to guide

the interpretation of the appropriateness of clinicians' CIPN assessment and management approaches.

2.4 Statistical Analyses

All analyses were conducted using R version 3.4.1 [36]. Several approaches were used to characterize participant-clinician communication regarding CIPN. We tabulated the frequency of participant-clinician assessment and management characteristics from the review of the audio recordings and medical record. We also calculated the frequency of concordance between participant-clinician discussions of CIPN and clinician documentation of CIPN.

3.0 Results

3.1 Sample Characteristics

Of an original 517, 159 participants (31%) [35] met the inclusion criteria for this analysis. Table 1 describes the demographic and cancer diagnosis/treatment-related characteristics of the analyzed sample. Slightly more intervention group (54%) than control group (46%) participants were included in the analyzed sample. Overall, the sample was mainly Caucasian, employed/working, male gender, receiving care as a medical oncology patient, receiving platinum-based chemotherapy, diagnosed with advanced cancer, and had a median age of 55 years (*Range* = 22 – 87) (Table 1). Opioids were the most frequently prescribed pain medication (pain from any origin). At T2, the majority of participants had received less than 1/3 of their neurotoxic chemotherapy regimen and were at a "low risk" of developing CIPN based on cumulative neurotoxic chemotherapy dose received [37–40]. As for clinician-related demographics, the type of clinician present at the T2 visits included: 1) physician led (60%), nurse practitioner led (26%), physician and nurse practitioner led (9%), physician assistant led (4%), and other (1%) (i.e., nurse and/or clinical research coordinator).

3.2 CIPN Assessment Characteristics

Table 2 describes the frequency of participant-clinician CIPN communication and clinician CIPN documentation. CIPN was documented in 73/159 (46%) clinical encounters, and clinicians were more likely to document the presence of non-painful CIPN than painful or motor CIPN. CIPN was discussed in 70/159 (44%) clinician encounters (63% initiated by clinicians). Out of the 70 participant-clinician CIPN discussions, 44 (63%) participants reported some degree of CIPN. In this subset of participants reporting CIPN, non-painful CIPN severity, painful CIPN severity, concurrent motor CIPN symptoms, and at least one aspect of the CIPN symptom pattern were discussed in 18%, 11%, 34%, and 73% of encounters, respectively. On average, clinicians asked 2.66 (*Range* = 0 – 19) closed ended CIPN assessment questions, while asking an average of 0.7 (*Range* = 0 – 3) open ended CIPN assessment questions. Clinicians asked a variety of initial CIPN assessment questions to patients who reported CIPN (n = 44) (Table 3). Particularly, clinicians asked participants about numbness and tingling without reference to specific location (36%) (e.g., "any numbness or tingling?"). Most clinicians explored participants' report of CIPN (77%). The frequency of patient-clinician CIPN discussions was higher when a physician (44/95, 46%) was present in comparison to when a nurse practitioner (14/41, 34%) was present. Similarly,

physicians (51/95, 54%) documented CIPN more frequently than nurse practitioners (14/41, 34%). Lastly, CIPN discussion (42/86, 49% vs. 28/73, 38%) and documentation (45/86, 52% vs. 28/73, 38%) frequencies were higher in intervention group participants than control group participants.

3.3 Concordance Between CIPN Symptom Discussion and CIPN Documentation

Table 4 highlights the frequency of concordance between clinician CIPN documentation and participant-clinician CIPN discussion. When CIPN was discussed ($n = 70$), the clinicians documented CIPN symptoms in 67% of cases. Incidence of CIPN documentation was slightly higher when the participant initiated the CIPN discussion. Clinicians were more likely to document CIPN symptoms (73%) when the participant reported CIPN symptoms ($n = 44$); when patients denied CIPN symptoms ($n = 26$), clinicians documented the absence of symptoms less often (58%). CIPN documentation incidence was lowest when CIPN was not discussed ($n = 89$) during the participant-clinician interaction (29%). CIPN was discussed and documented more often in patients who did not have other severe cancer treatment-related symptoms in comparison to those who did have other severe cancer treatment-related symptoms.

3.4 CIPN Management Characteristics

CIPN symptoms were considered appropriately managed in 3¼4 (70%) of participants. The most frequently administered management strategy was CIPN education or a CIPN monitoring plan ($n = 22$), followed by no discussion of treatment ($n = 20$), dose reduction ($n = 4$), and pharmacological treatment ($n = 4$). Providing CIPN education and/or recommending a CIPN monitoring plan was considered appropriate management in 21/22 (95%) instances prescribed. No discussion of treatment was considered an appropriate management plan in 11/20 (55%) instances (e.g., low CIPN severity and did not interfere with function). Neurotoxic chemotherapy dose reduction was considered appropriate management in 4/4 (100%) of instances. Of the four pharmacological treatments offered for CIPN, only one (gabapentin for non-painful CIPN) was considered appropriate management. Other pharmacological treatments offered that were considered inappropriate management included vitamin B6 for non-painful CIPN, TUMS for hand cramping, and Tylenol for non-painful CIPN. Clinicians verified dose reduction management plans with patients in 4/4 instances, but only verified pharmacological management recommendations with patients in ¼ instances.

4.0 Discussion and Conclusion

4.1 Discussion

Study results demonstrated that clinicians discussed and documented CIPN in less than 50% of clinical encounters with participants receiving neurotoxic chemotherapy. Low patient-clinician CIPN discussion and documentation frequency may have been a result of deficiencies in core aspects of patient-clinician communication. Clinicians met key aspects of patient- centered communication such as compassionate care and sensitivity to patients' needs [25] as they adequately 1) provided CIPN education or encouragement to continually monitor mild CIPN symptoms and 2) acknowledged and explored participants' CIPN

symptoms. However, related to sharing information [25], clinicians infrequently asked open ended questions about CIPN symptoms. Further, clinicians often used general terms to ask about neuropathy or only asked about neuropathy symptoms in relation to upper or lower extremities alone. The sole use of closed-ended questions and/or vague neuropathy descriptors is suboptimal as participants report difficulty describing common CIPN symptoms such as numbness, tingling, or neuropathic pain [17,18]. In addition to using more open-ended questions, clinicians should use patient- friendly descriptors to characterize numbness (e.g., falling asleep), tingling (e.g., pins and needles), and pain (e.g., burning, electric-shock) [17,18]. Overall, improved patient-clinician communication may increase the early detection and treatment of CIPN.

Our results highlight several deficiencies in CIPN assessment that may directly influence CIPN management. Non-painful, painful, and motor CIPN severity was rarely assessed. Determining the type and severity of CIPN will help guide administration of appropriate management interventions (e.g., duloxetine for painful CIPN) [28]. Moreover, participant-clinician CIPN symptom discussions were not consistently documented by clinicians in the electronic medical record. Regardless of symptom severity, CIPN discussions should be documented at every clinical encounter to track symptom progression over time and provide timely intervention. Finally, consistent with previous evidence regarding nurses' knowledge of CIPN prevention or treatment strategies [15], clinicians in this analysis supported use of pharmacological agents not recommended for CIPN symptom management (e.g., vitamin B6) [29]. It is difficult to critically appraise the appropriateness of clinicians' pharmacological recommendations for CIPN because participants were experiencing minimal symptoms and there were no formal clinical guidelines for CIPN management during the conduct of the original study (2009–2011). Nevertheless, it is important for clinicians to stay up to date on the latest clinical practice guidelines for CIPN management so recommended pharmacological agents are administered [29]. The administration of recommended pharmacological agents for CIPN is especially important in light of recent findings demonstrating that opioids are frequently prescribed for cancer survivors with CIPN [41], but are not recommended for CIPN treatment [29] and are associated with a high frequency of deaths related to misuse [42].

One possible reason for low participant-clinician CIPN discussion and clinician documentation frequency was that the clinician summary only highlighted QLQ-CIPN20 scores over 50 as problematic. Several previous studies report that individuals currently receiving or post neurotoxic chemotherapy [33,43,44] routinely report mean QLQ-CIPN20 sensory and motor subscale mean scores under 50. Therefore, the use of a normative threshold score of 50 on the QLQ-CIPN20 subscales to prompt further CIPN assessment and self-care instruction within the ESRA-C may have been suboptimal. Future studies using the QLQ-CIPN20 as a screening measure should consider using a lower cut score to identify patients with CIPN. Alternatively, a different patient reported outcome measure may be used to enhance CIPN screening. Brief patient reported outcome measures such as the Patient Reported Outcomes version of the National Cancer Institute Common Terminology Criteria for Adverse Events (PRO-CTCAE™) [45–47] may be preferable in clinic settings to the QLQ-CIPN20 for the screening of CIPN. The PRO-CTCAE CIPN component consists of two items that query CIPN severity and associated interference over the past seven days (0 –

4 scale; higher scores = worse symptoms). The PRO-CTCAE severity and interference items have demonstrated sufficient concurrent validity as evidenced by moderate to high correlations with the QLQ-CIPN20 sensory ($r = 0.76$) and motor subscales ($r = 0.55$), respectively [34]. Due to its brevity, simple scoring procedures, and promising validity in patients receiving neurotoxic chemotherapy, the PRO-CTCAE may be used as an alternative to the QLQ-CIPN20 as a CIPN screening measure.

The results of this study indicate the need for refined clinical systems to improve the assessment and subsequent management of CIPN in clinical practice. To our knowledge, there has been one previously conducted study that has examined the efficacy of an intervention to improve clinicians' CIPN assessment and management documentation. The authors demonstrated that implementation of a web-based CIPN care planning system intervention improved clinicians' documentation of numbness and non-painful CIPN management in women with breast cancer receiving taxane-based chemotherapy ($N = 48$ notes) [16]. However, this study was conducted in a small sample, the intervention was not compared to a control condition, and the intervention did not improve other measured outcomes such as documentation of tingling or CIPN pain. Future work is necessary to integrate existing recommended CIPN assessment and management approaches into practice. A nursing CIPN assessment and management algorithm provides a blueprint to guide nurses in the assessment and management of CIPN [9]. Briefly, this algorithm: 1) prompts nurses to ask patients about the presence of sensory and motor CIPN, 2) provides recommendations for further assessment based on the patient's reported symptoms (e.g., balance testing for patient-reported motor CIPN symptoms), and 3) generates management recommendations based on the type and severity of CIPN symptoms (e.g., physical therapy/occupational therapy referral for problems with fine motor skills). This algorithm may be tested in the future by embedding components of the algorithm within web-based symptom assessment and management technology for use by all clinicians. More specifically, the algorithm may be updated to include promising screening measures such as PRO-CTCAE CIPN severity and interference items and the most recent [29] clinical practice guidelines to guide the management of sensory [28] and/or motor CIPN symptoms [30,31].

There are several limitations to this research. First, several aspects of the original study's design were not optimal specifically for examining CIPN severity and participant-clinician communication. For instance, CIPN discussion and documentation frequencies were recorded three to six weeks into participants' neurotoxic chemotherapy regimens, thus, most participants had not received cumulative neurotoxic chemotherapy doses associated with severe CIPN symptoms [37–40]. Also, the use of a cutoff score of "50" on the QLQ-CIPN20 most likely did not identify all patients with problematic CIPN symptoms. It's possible that clinicians did not initiate CIPN discussions with participants because CIPN was not highlighted as a problem on the summary sheet. Similarly, participants may have been less likely to initiate CIPN discussions because they believed that their clinician would be alerted of CIPN following the completion of the QLQ-CIPN20 within the web-based symptom assessment technology. Second, CIPN discussion and documentation incidence may have been promoted by participant interaction with web-based symptom self-report and self-care technology as evidenced by data suggesting that intervention group participants had higher CIPN discussion and documentation rates than control group participants. Resultantly, CIPN

discussion and documentation results may have been inflated and not reflective of typical patterns seen in routine practice. Third, all participant-clinician interactions were audio-recorded. As such, we were not able to assess non-verbal communication between participants and clinicians. Fourth, all results are descriptive and no causal inferences regarding the relationship between variables can be determined. Fifth, the recruited sample was fairly homogenous with regard to race, so, our results are not widely generalizable. Race/ethnicity is important to account for because patients' race/ethnicity may impact the quality of patient-clinician communication [48]. Lastly, as this was a cross-sectional analysis, we did not assess for all possible explanations as to why CIPN symptom management was not provided to participants reporting CIPN symptoms (e.g., dose reductions, patient refusal of treatment, contraindications). Subsequently, any participant cases rated as inappropriate CIPN management should be interpreted with caution and do not necessarily reflect inadequate care.

4.2 Conclusion

This study is among the first to characterize patient-clinician communication regarding CIPN assessment and management. Study results revealed several gaps in patient-clinician communication of CIPN symptoms, mainly, low frequency of CIPN discussion (e.g., severity, motor impairment, open-ended questions) and documentation. Further research is needed to develop and implement processes that aid in effective patient-clinician CIPN communication approaches to facilitate timely CIPN assessment and management.

4.3 Practice Implications

The early identification and management of CIPN is critical as CIPN may worsen with each neurotoxic chemotherapy dose received [37–40]. Thus, effective patient-clinician communication is required at each clinic visit during neurotoxic chemotherapy treatment to identify initial signs of CIPN and offer appropriate treatment. Strategies to facilitate effective CIPN communication may include: 1) asking open-ended questions about CIPN symptoms that allow patients to describe their symptoms in their own words, 2) using patient-friendly descriptors regarding sensory CIPN symptoms, 3) asking about the type and severity of CIPN (e.g., painful vs. non-painful), 4) asking about CIPN-related physical function deficits, or 5) administering reliable and valid patient-reported (e.g., PRO-CTCAE items) or clinician- administered (e.g., Total Neuropathy Score© [49–52]) CIPN measures.

Funding:

The parent trial was supported by the National Institutes of Health [R01 NR008726]. Current work was supported by the Mittelman Integrative Oncology Family Fund. The funding sources had no role in any aspect of study design, data collection, or manuscript writing and submission.

References

[1]. Halpern MT, Yabroff KR, Prevalence of Outpatient Cancer Treatment in the United States: Estimates from the Medical Panel Expenditures Survey (MEPS), 26 (2008). doi: 10.1080/07357900801905519.

[2]. Basch E, Deal AM, Dueck AC, Scher HI, Kris MG, Hudis C, Schrag D, Overall Survival Results of a Trial Assessing Patient-Reported Outcomes for Symptom Monitoring During Routine

Cancer Treatment., JAMA. 318 (2017) 197–198. doi:10.1001/jama.2017.7156. [PubMed: 28586821]

[3]. Reilly CM, Bruner DW, Mitchell SA, Minasian LM, Basch E, Dueck AC, Cella D, Reeve BB, A literature synthesis of symptom prevalence and severity in persons receiving active cancer treatment., Support. Care Cancer. 21 (2013) 1525–50. doi:10.1007/s00520-012-1688-0.

[4]. Smith EML, Bridges CM, Kanzawa G, Knoerl R, Kelly JP, Berezovsky A, Woo C, Cancer Treatment-Related Neuropathic Pain Syndromes—Epidemiology and Treatment: An Update, Curr. Pain Headache Rep. 18 (2014) 459. doi:10.1007/s11916-014-0459-7.

[5]. Stubblefield MD, Burstein HJ, Burton AW, Custodio CM, Deng GE, Ho M, Junck L, Morris GS, Paice JA, Tummala S, Von Roenn JH, National Comprehensive Cancer Network Task Force Report: Management of Neuropathy in Cancer., J. Natl. Compr. Canc. Netw 7 Suppl 5 (2009) S1–S26; quiz S27–8.

[6]. Mols F, Beijers T, Vreugdenhil G, van de Poll-Franse L, Chemotherapy-induced peripheral neuropathy and its association with quality of life: a systematic review, Support. Care Cancer 22 (2014) 2261–2269. doi:10.1007/s00520-014-2255-7. [PubMed: 24789421]

[7]. Winters-Stone KM, Horak F, Jacobs PG, Trubowitz P, Dieckmann NF, Stoyles S, Faithfull S, Falls, Functioning, and Disability Among Women With Persistent Symptoms of Chemotherapy-Induced Peripheral Neuropathy, J. Clin. Oncol 35 (2017) 2604–2612. doi:10.1200/JCO.2016.71.3552. [PubMed: 28586243]

[8]. Pike CT, Birnbaum HG, Muehlenbein CE, Pohl GM, Natale RB, Healthcare costs and workloss burden of patients with chemotherapy-associated peripheral neuropathy in breast, ovarian, head and neck, and nonsmall cell lung cancer., Chemother. Res. Pract 2012 (2012) 913848. doi:10.1155/2012/913848. [PubMed: 22482054]

[9]. Tofthagen C, Visovsky CM, Hopgood R, Chemotherapy-induced peripheral neuropathy: an algorithm to guide nursing management., Clin. J. Oncol. Nurs 17 (2013) 138–44. doi:10.1188/13.CJON.138-144. [PubMed: 23538249]

[10]. Teoh D, Smith TJ, Song M, Spirtos NM, Care After Chemotherapy: Peripheral Neuropathy, Cannabis for Symptom Control, and Mindfulness, Am. Soc. Clin. Oncol. Educ. B (2018) 469–479. doi:10.1200/EDBK_209437.

[11]. McCrary JMM, Goldstein D, Boyle F, Cox K, Grimison P, Kiernan MC, Krishnan AV, Lewis CR, Webber K, Baron-Hay S, Horvath L, Park SB, IN FOCUS Delphi working party, Optimal clinical assessment strategies for chemotherapy-induced peripheral neuropathy (CIPN): a systematic review and Delphi survey, Support. Care Cancer 25 (2017). doi:10.1007/s00520-017-3772-y.

[12]. Binner M, Ross D, Browner I, Chemotherapy-induced peripheral neuropathy: assessment of oncology nurses' knowledge and practice, Oncol. Nurs. Forum 38 (2011) 448–454. doi:10.1188/11.ONF.448-454. [PubMed: 21708535]

[13]. Visovsky C, Haas M, Faiman B, Kurtin S, Shaftic AM, Lyden E, Rice J, Nurse self- evaluation of assessment of chemotherapy-induced peripheral neuropathy in patients with cancer., J. Adv. Pract. Oncol 3 (2012) 319–25. http://www.ncbi.nlm.nih.gov/pubmed/25031961. [PubMed: 25031961]

[14]. Alberti P, Rossi E, Cornblath DR, Merkies ISJ, Postma TJ, Frigeni B, Bruna J, Velasco R, Argyriou AA, Kalofonos HP, Psimaras D, Ricard D, Pace A, Galiè E, Briani C, Dalla Torre C, Faber CG, Lalisang RI, Boogerd W, Brandsma D, Koeppen S, Hense J, Storey D, Kerrigan S, Schenone A, Fabbri S, Valsecchi MG, Cavaletti G, CI-PeriNomS Group, Physician-assessed and patient-reported outcome measures in chemotherapy-induced sensory peripheral neurotoxicity: two sides of the same coin., Ann. Oncol 25 (2014) 257–64. doi:10.1093/annonc/mdt409. [PubMed: 24256846]

[15]. Smith EML, Campbell G, Tofthagen C, Kottschade L, Collins ML, Warton C, Ghosh B, Ronis DL, Mallory GA, Visovsky C, Nursing knowledge, practice patterns, and learning preferences regarding chemotherapy-induced peripheral neuropathy., Oncol. Nurs. Forum 41 (2014) 669–79. doi:10.1188/14.ONF.669-679. [PubMed: 25355022]

[16]. Knoerl R, Bridges C, Smith G, Yang J, Kanzawa-Lee G, Smith E, Chemotherapy-Induced Peripheral Neuropathy: Use of an Electronic Care Planning System to Improve Adherence to Recommended Assessment and Management Practices, Clin. J. Oncol. Nurs 22 (2018) E134–E140. doi:10.1188/18.CJON.E134-E140. [PubMed: 30239516]

[17]. Tanay MAL, Armes J, Ream E, The experience of chemotherapy-induced peripheral neuropathy in adult cancer patients: a qualitative thematic synthesis., Eur. J. Cancer Care (Engl). 26 (2017) e12443. doi:10.1111/ecc.12443.

[18]. Tofthagen C, Patient perceptions associated with chemotherapy-induced peripheral neuropathy., Clin. J. Oncol. Nurs 14 (2010) E22–8. doi:10.1188/10.CJON.E22-E28. [PubMed: 20529785]

[19]. Smith EML, Knoerl R, Yang JJ, Kanzawa-Lee G, Lee D, Bridges CM, In Search of a Gold Standard Patient-Reported Outcome Measure for Use in Chemotherapy- Induced Peripheral Neuropathy Clinical Trials, Cancer Control. 25 (2018) 107327481875660. doi: 10.1177/1073274818756608.

[20]. Hershman DL, Lacchetti C, Dworkin RH, Lavoie Smith EM, Bleeker J, Cavaletti G, Chauhan C, Gavin P, Lavino A, Lustberg MB, Paice J, Schneider B, Smith ML, Smith T, Terstriep S, Wagner-Johnston N, Bak K, Loprinzi CL, A.S. of C. Oncology, Prevention and management of chemotherapy-induced peripheral neuropathy in survivors of adult cancers: American Society of Clinical Oncology clinical practice guideline, J. Clin. Oncol 32 (2014) 1941–1967. doi:10.1200/JCO.2013.54.0914. [PubMed: 24733808]

[21]. Dwamena F, Holmes-Rovner M, Gaulden CM, Jorgenson S, Sadigh G, Sikorskii A, Lewin S, Smith RC, Coffey J, Olomu A, Beasley M, Interventions for providers to promote a patient-centred approach in clinical consultations, Cochrane Database Syst. Rev 12 (2012) CD003267. doi:10.1002/14651858.CD003267.pub2. [PubMed: 23235595]

[22]. Kelley JM, Kraft-Todd G, Schapira L, Kossowsky J, Riess H, The Influence of the Patient-Clinician Relationship on Healthcare Outcomes: A Systematic Review and Meta-Analysis of Randomized Controlled Trials, PLoS One. 9 (2014) e94207. doi:10.1371/journal.pone.0094207. [PubMed: 24718585]

[23]. Berry DL, Blumenstein BA, Halpenny B, Wolpin S, Fann JR, Austin-Seymour M, Bush N, Karras BT, Lober WB, McCorkle R, Enhancing patient-provider communication with the electronic self-report assessment for cancer: a randomized trial, J. Clin. Oncol 29 (2011) 1029–1035. [PubMed: 21282548]

[24]. Gilligan T, Coyle N, Frankel RM, Berry DL, Bohlke K, Epstein RM, Finlay E, Jackson VA, Lathan CS, Loprinzi CL, Nguyen LH, Seigel C, Baile WF, Patient-Clinician Communication: American Society of Clinical Oncology Consensus Guideline., J. Clin. Oncol 35 (2017) 3618–3632. doi:10.1200/JCO.2017.75.2311. [PubMed: 28892432]

[25]. Constand MK, MacDermid JC, Dal Bello-Haas V, Law M, Scoping review of patient-centered care approaches in healthcare, BMC Health Serv. Res 14 (2014) 271. doi: 10.1186/1472-6963-14-271. [PubMed: 24947822]

[26]. Berry DL, Hong F, Halpenny B, Partridge AH, Fann JR, Wolpin S, Lober WB, Bush NE, Parvathaneni U, Back AL, Amtmann D, Ford R, Electronic self-report assessment for cancer and self-care support: results of a multicenter randomized trial, J. Clin. Oncol 32 (2014) 199–205. doi:10.1200/JCO.2013.48.6662. [PubMed: 24344222]

[27]. LeBaron VT, Blonquist TM, Beecy A, Berry DL, Communicating comfort: How do cancer outpatients and health care providers talk about pain?, J. Clin. Oncol 32 (2014) 229–229. doi: 10.1200/jco.2014.32.31_suppl.229. [PubMed: 24323034]

[28]. Smith EM, Pang H, Cirrincione C, Fleishman S, Paskett ED, Ahles T, Bressler LR, Fadul CE, Knox C, Le-Lindqwister N, Gilman PB, Shapiro CL, A. for C.T. in Oncology, Effect of duloxetine on pain, function, and quality of life among patients with chemotherapy-induced painful peripheral neuropathy: a randomized clinical trial, Jama. 309 (2013) 1359–1367. doi: 10.1001/jama.2013.2813. [PubMed: 23549581]

[29]. Hershman DL, Lacchetti C, Dworkin RH, Lavoie Smith EM, Bleeker J, Cavaletti G, Chauhan C, Gavin P, Lavino A, Lustberg MB, Paice J, Schneider B, Lou Smith M, Smith T, Terstriep S, Wagner-Johnston N, Bak K, Loprinzi CL, A.S. of C. Oncology, American Society of Clinical Oncology, A.S. of C. Oncology, Prevention and management of chemotherapy-induced peripheral neuropathy in survivors of adult cancers: American Society of Clinical Oncology clinical practice guideline, J. Clin. Oncol 32 (2014) 1941–1967. doi:10.1200/JCO.2013.54.0914. [PubMed: 24733808]

[30]. Kleckner IR, Kamen C, Gewandter JS, Mohile NA, Heckler CE, Culakova E, Fung C, Janelsins MC, Asare M, Lin P-J, Reddy PS, Giguere J, Berenberg J, Kesler SR, Mustian KM, Effects of

exercise during chemotherapy on chemotherapy-induced peripheral neuropathy: a multicenter, randomized controlled trial, Support. Care Cancer. (2017). doi:10.1007/s00520-017-4013-0.

[31]. Zimmer P, Trebing S, Timmers-Trebing U, Schenk A, Paust R, Bloch W, Rudolph R, Streckmann F, Baumann FT, Eight-week, multimodal exercise counteracts a progress of chemotherapy-induced peripheral neuropathy and improves balance and strength in metastasized colorectal cancer patients: a randomized controlled trial, Support. Care Cancer. 26 (2018). 615–624 doi: 10.1007/s00520-017-3875-5. [PubMed: 28963591]

[32]. Postma TJ, Aaronson NK, Heimans JJ, Muller MJ, Hildebrand JG, Delattre JY, Hoang-Xuan K, Lanteri-Minet M, Grant R, Huddart R, Moynihan C, Maher J, Lucey R, E.Q. of L. Group, The development of an EORTC quality of life questionnaire to assess chemotherapy-induced peripheral neuropathy: the QLQ-CIPN20, Eur. J. Cancer 41 (2005) 1135–1139. doi:S0959–8049(05)00160–7 [pii]. [PubMed: 15911236]

[33]. Smith EML, Barton DL, Qin R, Steen PD, Aaronson NK, Loprinzi CL, Assessing patient-reported peripheral neuropathy: the reliability and validity of the European Organization for Research and Treatment of Cancer QLQ-CIPN20 Questionnaire, Qual. Life Res 22 (2013) 2787–2799. doi:10.1007/s11136-013-0379-8. [PubMed: 23543373]

[34]. Knoerl R, Gray E, Stricker C, Mitchell SA, Kippe K, Smith G, Dudley WN, Lavoie Smith EM, Electronic versus paper-pencil methods for assessing chemotherapy- induced peripheral neuropathy, Support. Care Cancer 25 (2017) 3437–3446. doi:10.1007/s00520-017-3764-y. [PubMed: 28577231]

[35]. Berry DL, Hong F, Halpenny B, Partridge A, Fox E, Fann JR, Wolpin S, Lober WB, Bush N, Parvathaneni U, Amtmann D, Ford R, The electronic self report assessment and intervention for cancer: promoting patient verbal reporting of symptom and quality of life issues in a randomized controlled trial, BMC Cancer. 14 (2014) 513. doi:10.1186/1471-2407-14-513. [PubMed: 25014995]

[36]. R Development Core Team, R: A language and environment for statistical computing., (2017). https://www.r-project.org.

[37]. Eckhoff L, Knoop AS, Jensen M-B, Ejlertsen B, Ewertz M, Risk of docetaxel-induced peripheral neuropathy among 1,725 Danish patients with early stage breast cancer., Breast Cancer Res. Treat 142 (2013) 109–18. doi:10.1007/s10549-013-2728-2. [PubMed: 24132874]

[38]. Grisold W, Cavaletti G, Windebank AJ, Peripheral neuropathies from chemotherapeutics and targeted agents: diagnosis, treatment, and prevention., Neuro. Oncol 14 Suppl 4 (2012) iv45–54. doi:10.1093/neuonc/nos203. [PubMed: 23095830]

[39]. Kerckhove N, Collin A, Condé S, Chaleteix C, Pezet D, Balayssac D, Long-Term Effects, Pathophysiological Mechanisms, and Risk Factors of Chemotherapy-Induced Peripheral Neuropathies: A Comprehensive Literature Review., Front. Pharmacol 8 (2017) 86. doi:10.3389/fphar.2017.00086. [PubMed: 28286483]

[40]. Pace A, Nisticò C, Cuppone F, Bria E, Galiè E, Graziano G, Natoli G, Sperduti I, Jandolo B, Calabretta F, Tomao S, Terzoli E, Peripheral neurotoxicity of weekly paclitaxel chemotherapy: a schedule or a dose issue?, Clin. Breast Cancer. 7 (2007) 550–4. doi:10.3816/CBC.2007.n.010. [PubMed: 17509163]

[41]. Shah A, Hoffman EM, Mauermann ML, Loprinzi CL, Windebank AJ, Klein CJ, Staff NP, Incidence and disease burden of chemotherapy-induced peripheral neuropathy in a population-based cohort., J. Neurol. Neurosurg. Psychiatry (2018) jnnp-2017–317215. doi:10.1136/jnnp-2017-317215.

[42]. Gomes T, Tadrous M, Mamdani MM, Paterson JM, Juurlink DN, The Burden of Opioid-Related Mortality in the United States, JAMA Netw. Open 1 (2018) e180217. doi: 10.1001/jamanetworkopen.2018.0217. [PubMed: 30646062]

[43]. Simon NB, Danso MA, Alberico TA, Basch E, Bennett AV, The prevalence and pattern of chemotherapy-induced peripheral neuropathy among women with breast cancer receiving care in a large community oncology practice, Qual. Life Res 26 (2017). doi:10.1007/s11136-017-1635-0.

[44]. Loprinzi CL, Reeves BN, Dakhil SR, Sloan JA, Wolf SL, Burger KN, Kamal A, Le-Lindqwister NA, Soori GS, Jaslowski AJ, Novotny PJ, Lachance DH, Natural history of paclitaxel-associated

acute pain syndrome: prospective cohort study NCCTG N08C1, J. Clin. Oncol 29 (2011) 1472–1478. doi:10.1200/JCO.2010.33.0308. [PubMed: 21383290]

[45]. Dueck AC, Mendoza TR, Mitchell SA, Reeve BB, Castro KM, Rogak LJ, Atkinson TM, Bennett AV, Denicoff AM, O'Mara AM, Li Y, Clauser SB, Bryant DM, Bearden JD, Gillis TA, Harness JK, Siegel RD, Paul DB, Cleeland CS, Schrag D, Sloan JA, Abernethy AP, Bruner DW, Minasian LM, Basch E, National Cancer Institute PRO-CTCAE Study Group, Validity and Reliability of the US National Cancer Institute's Patient-Reported Outcomes Version of the Common Terminology Criteria for Adverse Events (PRO-CTCAE)., JAMA Oncol. 1 (2015) 1051–9. doi:10.1001/jamaoncol.2015.2639. [PubMed: 26270597]

[46]. Basch E, Reeve BB, Mitchell SA, Clauser SB, Minasian LM, Dueck AC, Mendoza TR, Hay J, Atkinson TM, Abernethy AP, Bruner DW, Cleeland CS, Sloan JA, Chilukuri R, Baumgartner P, Denicoff A, St Germain D, O'Mara AM, Chen A, Kelaghan J, Bennett AV, Sit L, Rogak L, Barz A, Paul DB, Schrag D, Development of the National Cancer Institute's patient-reported outcomes version of the common terminology criteria for adverse events (PRO-CTCAE)., J. Natl. Cancer Inst 106 (2014). doi:10.1093/jnci/dju244.

[47]. Hay JL, Atkinson TM, Reeve BB, Mitchell SA, Mendoza TR, Willis G, Minasian LM, Clauser SB, Denicoff A, O'Mara A, Chen A, Bennett AV, Paul DB, Gagne J, Rogak L, Sit L, Viswanath V, Schrag D, Basch E, NCI PRO-CTCAE Study Group, Cognitive interviewing of the US National Cancer Institute's Patient-Reported Outcomes version of the Common Terminology Criteria for Adverse Events (PRO-CTCAE)., Qual. Life Res 23 (2014) 257–69. doi:10.1007/s11136-013-0470-1. [PubMed: 23868457]

[48]. Pérez-Stable EJ, El-Toukhy S, Communicating with diverse patients: How patient and clinician factors affect disparities, Patient Educ. Couns (2018). doi:10.1016/j.pec.2018.08.021.

[49]. Chaudhry V, Rowinsky EK, Sartorius SE, Donehower RC, Cornblath DR, Peripheral neuropathy from taxol and cisplatin combination chemotherapy: clinical and electrophysiological studies, Ann. Neurol 35 (1994) 304–311. doi:10.1002/ana.410350310. [PubMed: 7907208]

[50]. Cornblath DR, Chaudhry V, Carter K, Lee D, Seysedadr M, Miernicki M, Joh T, Total neuropathy score: validation and reliability study., Neurology. 53 (1999) 1660–4. http://www.ncbi.nlm.nih.gov/pubmed/10563609. [PubMed: 10563609]

[51]. Lavoie Smith EM, Cohen JA, Pett MA, Beck SL, Smith EML, Cohen JA, Pett MA, Beck SL, Lavoie Smith EM, Cohen JA, Pett MA, Beck SL, The validity of neuropathy and neuropathic pain measures in patients with cancer receiving taxanes and platinums, Oncol. Nurs. Forum 38 (2011) 133–142. doi:10.1188/11.ONF.133-142. [PubMed: 21356652]

[52]. Smith EML, Cohen JA, Pett MA, Beck SL, The reliability and validity of a modified total neuropathy score-reduced and neuropathic pain severity items when used to measure chemotherapy-induced peripheral neuropathy in patients receiving taxanes and platinums, Cancer Nurs. 33 (2010) 173–183. doi:10.1097/NCC.0b013e3181c989a3. [PubMed: 20357656]

Highlights

- CIPN was discussed and documented by clinicians in less than half of participants
- Clinicians adequately managed mild CIPN symptoms in most cases.
- Further intervention is needed to improve patient-centered CIPN communication

Table 1.

Demographics Characteristics of the Analytic Sample ($N = 159$)

Variable	Frequency (%)
Age at Baseline	
Median *(Range)*	55 (22–87)
Sex	
Male	97 (61%)
Female	62 (39%)
Treatment	
Intervention	86 (54%)
Control	73 (46%)
Race	
Caucasian	134 (84%)
Asian	3 (2%)
Native Hawaiian or other Pacific Islander	0
African American	4 (3%)
American Indian/Native Alaskan	1 (1%)
More than one race	2 (1%)
Missing	15 (9%)
Working Status	
Working	104 (65%)
Not working	41 (26%)
Missing	14 (9%)
Clinical Service	
Medical Oncology	140 (88%)
Radiation Oncology	19 (12%)
Cancer Diagnosis	
Breast	29 (18%)
Colorectal	28 (17%)
Prostate	25 (16%)
Head and Neck	19 (12%)
Testicular	14 (9%)
Bladder	12 (8%)
Esophageal	10 (6%)
Gastric	7 (4%)
Other Gastrointestinal Cancers	6 (4%)
Miscellaneous	5 (3%)
Unknown Primary	3 (2%)
Sarcoma	1 (1%)
Stage	

Variable	Frequency (%)
I	20 (13%)
II	31 (20%)
III	45 (28%)
IV	58 (36%)
Missing	5 (3%)
Chemotherapy Type at Timepoint 2	
Taxane Only	67 (42%)
Platinum Only	78 (49%)
Platinum and Taxane	14 (9%)
Neurotoxic Chemotherapy Duration at Timepoint 2	
Received less than 1/3 of planned treatment	73 (46%)
Received at least 1/3 of planned treatment	46 (29%)
Received at least 2/3 of planned treatment	31 (19%)
Completed treatment	9 (6%)
Cumulative M^2 Dose Category at Timepoint 2[a]	
Low Risk	119 (75%)
Moderate Risk	35 (22%)
High Risk	5 (3%)
Pain Medications Receiving at Timepoint 2	
Opioid(s) alone	21 (13%)
Gabapentin alone	2 (1%)
Acetaminophen and/or Non-Steroidal Anti-inflammatory drugs	2 (1%)
Calcium/Magnesium	1 (1%)
Gabapentin + Vitamin B6	1 (1%)
Pregabalin + Opioid	1 (1%)
Tegretol + Opioid	1 (1%)
None	130 (81%)
Previous Neurotoxic Chemotherapy Receipt	
Yes	8 (5%)
No	151 (95%)
Comorbid Conditions that Increase Chemotherapy-Induced Peripheral Neuropathy Risk	
Multiple	7 (4%)
Diabetes	6 (4%)
High Body Mass Index	5 (3%)
Baseline Neuropathy	4 (3%)
Chronic Pain	2 (1%)
None	135 (85%)
Concurrent Severe Cancer Treatment Symptoms	
Yes	43 (27%)

Variable	Frequency (%)
No or Unknown	116 (73%)
QLQ-CIPN20[b] Sensory (*n* = 158) at Timepoint 2	
Mean (*SD, Range*)	7.11 (10.01,0–62.96)
QLQ-CIPN20[b] Motor (*n* = 158) at Timepoint 2	
Mean (*SD, Range*)	6.09 (10.65,0–71.43)

[a]For participants receiving multiple neurotoxic chemotherapy agents, dose category was determined based on the highest dose one of the specific agents they were receiving. Cumulative neurotoxic dose categories were constructed based upon published literature [37–40].

[b]European Organisation for Research and Treatment of Cancer Quality of Life Chemotherapy-Induced Peripheral Neuropathy 20

Table 2.

Frequency of Participant-Clinician Communication and Documentation about Chemotherapy-Induced Peripheral Neuropathy (CIPN) Symptoms (N = 159)

Assessment Characteristics	Frequency (%)
CIPN Documentation (*n* = 73)	
- Non-Painful CIPN Documentation[a]	70 (96%)
- Painful CIPN Documentation[a]	37 (51%)
- Motor CIPN Documentation[a]	43 (59%)
Participant-Clinician Discussion of CIPN Symptoms (*n* = 70)	
- CIPN Discussion Initiated by Participant or Caregiver[b]	26 (37%)
- CIPN Discussion Initiated by Clinician[b]	44 (63%)
Participant Reported CIPN Symptoms (*n* = 44)	
- Non-Painful CIPN Symptom Intensity Discussion[c]	8 (18%)
- Painful CIPN Symptom Intensity Discussion[c]	5 (11%)
- Motor CIPN Symptom Discussion[c]	15 (34%)
- Discuss at Least One Aspect of OPQRT (Onset, Provocation, Palliation, Quality, Location, Radiation, Time History)[c]	32 (73%)
- Clinician Acknowledged Participant's CIPN Report[c]	7 (16%)
- Clinician Acknowledged and Explored Participant's CIPN Report[c]	34 (77%)
- Clinician Dismissed Participant's CIPN Report[c]	3 (7%)

[a]Frequency (%) was calculated using the number of times CIPN was documented as the denominator (n = 73).

[b]Frequency (%) was calculated using the number of times CIPN was discussed as the denominator (n = 70).

[c]Frequency (%) was calculated using the number of times participants reported CIPN as the denominator (n = 44)

Table 3.

Frequency and Examples of Initial Chemotherapy-Induced Peripheral Neuropathy (CIPN) Assessment Question Types Asked by Clinicians to Participants ($N = 44$)

Characteristic of CIPN Discussion	Frequency (%)	Quotes
Asked participant about numbness AND/OR tingling without reference to their extremities	16 (36%)	**a.** So, the peripheral neuropathy, the numbness and tingling? **b.** Any numbness or tingling? **c.** Still no tingling?
Asked participant about numbness AND tingling in both their upper and lower extremities	11 (25%)	**a.** Any numbness or tingling in your fingers or toes? **b.** Do you have numbness or tingling in your hands or feet
Asked participant about numbness OR tingling in either their upper OR lower extremities alone	10 (23%)	**a.** Tingling in fingers or toes? **b.** Any numbness in your fingers?
Asked about neuropathy in general	4 (9%)	**a.** Any neuropathy? **b.** It looks like you had some questions regarding the neuropathy…
Other	3 (7%)	**a.** Any hand-problems **b.** Any issues with the mouth sores or co Id-sensitivity

Table 4.

Concordance between Clinician Chemotherapy-Induced Peripheral Neuropathy (CIPN) Discussion and Documentation Frequency ($N = 159$)

	CIPN Documentation [Yes]	CIPN Documentation [No]	Total
CIPN Discussion (*N*= 159)			
No Discussion of Neuropathy	26 (29%)	63 (71%)	89
Discussion of Neuropathy	47 (67%)	23 (33%)	70
CIPN Discussion Initiation (*n* = 70)			
Participant or Caregiver Initiated CIPN Discussion	19 (73%)	7 (27%)	26
Clinician Initiated CIPN Discussion	28 (64%)	16 (36%)	44
Other Severe Cancer Treatment- Related Symptoms (*N* = 159)			
Participant Reported Other Severe Cancer Treatment-Related Symptoms	16 (37%)	27 (63%)	43
Participant Did Not Report Other Severe Cancer Treatment-Related Symptoms	57 (49%)	59(51%)	116
CIPN Symptom Report (*n* = 70)			
Participant Reported CIPN Symptoms in Audio Recording	32 (73%)	12 (27%)	44
Participant Denied CIPN Symptoms in Audio Recording	15 (58%)	11 (42%)	26