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Cognitive and Initial Psychometric Testing of the Errors of Care Omission Survey: A New Patient Safety Tool for Primary Care

Lusine Poghosyan, PhD, MPH, RN, FAAN,

Columbia University School of Nursing, New York, NY

Allison A. Norful, PhD, RN, ANP-BC,

Columbia University School of Nursing, New York, NY

Jianfang Liu, PhD,

Columbia University School of Nursing, New York, NY

Jonathan Shaffer, PhD

University of Colorado Denver, Denver, CO

Abstract

Background and Purpose: Most patient safety studies focus on errors of commission rather than on errors of omission. No tools measure errors of omission in primary care. We developed the Errors of Care Omission Survey (ECOS) and present its cognitive and psychometric testing.

Methods: Twenty-six primary care providers (PCPs) participated in cognitive interviews, which were audiotaped, transcribed, and analyzed. ECOS was also pilot tested with 37 PCPs. Item analysis and reliability testing was conducted.

Results: Interviewees agreed that ECOS measures errors of omission and items were clear. The response categories were revised. All items were correlated and subscales had high internal consistency reliability.

Conclusions: ECOS can measure errors of omission in primary care.

Keywords

errors of omission; primary care; patient safety; tool development

Most patient safety studies focus on errors of commission, defined as doing something wrong, such as administering a wrong medication or giving a wrong diagnosis (Hayward, Asch, Hogan, Hofer, & Kerr, 2005; Tehrani et al., 2013). However, patient safety is also significantly threatened by errors of omission, which are defined as a failure of right action, such as missed care (Kalisch, 2015) and outnumber errors of commission (Agency for Healthcare Research and Quality, 2008). These acts of omission can occur because of time

Correspondence regarding this article should be directed to Lusine Poghosyan, PhD, MPH, RN, FAAN, Associate Professor, Columbia University School of Nursing, 560 West 168th Street, Office 603, New York, NY 10032. lp2475@columbia.edu.

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pressures, prioritizing urgent health needs of patients, and poor organizational structures of healthcare settings (Hoff, Jameson, Hannan, & Flink, 2004; Molfenter et al., 2005).

Evidence on errors of omission, previously scarce in the literature, is slowly building. Researchers mainly focus on care delivered in hospitals. A systematic review of 42 studies showed that between 55% and 98% of hospital nurses report omitting one or more aspects of patient care, such as failing to prepare patients for discharge, ambulate them, or provide surveillance (Jones, Hamilton, & Murry, 2015). These errors of omission lead to hospital readmissions, falls, infections, and decreased patient satisfaction (Carthon, Lasater, Sloane, & Kutney-Lee, 2015; Lake, Germack, & Viscardi, 2016; Nelson & Flynn, 2015). To date, however, little evidence exists regarding errors of omission in primary care despite this setting being vulnerable to such errors because primary care providers (PCPs) manage a wide range of increasingly complex conditions through short encounters in overburdened practices (Colwill, Cultice, & Kruse, 2008; Institute of Medicine, 2012). PCPs report missing important aspects of patient care such as patient teaching or follow-up (Poghosyan et al., 2017). Furthermore, errors of omission are difficult to identify because of a lack of standard reporting mechanisms or systems for collecting this information. This limitation restricts the evaluation of clinical practice and challenges administrators', clinicians', and policymakers' abilities to implement changes to promote patient safety in primary care. Thus, alternative methods of investigating these errors are necessary.

One approach is to assess PCPs' perceptions, which can be a valuable source of information to help design patient safety systems (Schiff et al., 2009). However, there are no reliable and valid tools to gather PCPs' input regarding errors of omission. In contrast, there are 14 self-report tools to measure these errors in hospitals (Jones et al., 2015). One primary care safety tool measures both errors of omission and commission (Wammes, Verstappen, Gaal, & Wensing, 2013); however, it was developed for physicians and nurses in Europe, who have a different scope of practice and deliver care in a different healthcare context than PCPs in the United States. Furthermore, a recent systematic review of patient safety measures in primary care concluded that, compared to the number of patient safety tools in inpatient settings, the number of such tools in primary care is low (Hatoun et al., 2017). Thus, in order to guide efforts to promote patient safety in primary care, and particularly to prevent errors of omission, a valid and reliable tool to measure these errors is necessary to identify them, determine their prevalence, and develop prevention interventions. The purpose of this study was to develop a new survey tool to measure errors of omission.

BACKGROUND AND CONCEPTUAL FRAMEWORK

Errors of Care Omission Survey

We developed the first self-report survey tool, the Errors of Care Omission Survey (ECOS) (Table 1), to measure errors of omission from the perspectives of PCPs, both nurse practitioners (NPs) and physicians, as primary care is being transformed into team-based care, and the NP workforce will grow significantly in the near future (Auerbach, 2012; Ladden et al., 2013; National Committee for Quality Assurance, 2011). Errors of omission were conceptualized as "any aspect of patient care that is omitted (either in part or in whole)," (Kalisch, Landstrom, & Hinshaw, 2009), which served as the foundation of the

ECOS. We reviewed existing evidence on patient safety and classification of errors in primary care (Elder & Dovey, 2002; Panesar et al., 2016). Four domains emerged to constitute errors of omission: self-management support, follow-up, emotional health support, and care integration. Thirty items were created from the evidence to fit each conceptual domain, which were technically and grammatically evaluated to assure items were simple and concise, and measured one aspect of care with language familiar to PCPs (Nunnally & Bernstein, 1994). The items were phrased to explore PCPs' perceptions by asking them to rate their concerns from "strongly disagree" to "strongly agree" on aspects of care that are omitted. In this study, we conducted the cognitive testing of the ECOS followed by pilot testing to assess its initial psychometric properties.

METHODS

Cognitive Testing

Survey tool development relies on assumptions that each item has the same meaning to all respondents who are able to understand them, have the information being sought, and are willing to answer them. These assumptions should be tested to assure a valid tool, which can be done through cognitive interviews—a widely used method in tool development (Collins, 2003). During cognitive interviews, researchers can assess whether the participant understands the question as intended (comprehension), has information to provide (retrieval of information), is able to formulate an answer (judgment), and is willing to respond (response) (Collins, 2003). Cognitive interviews employ verbalization of thoughts, feelings, and interpretations while responding to questions and can reveal issues of item interpretation and help address them (Willis, 2005). Participants are also often asked to suggest alternative wording to increase clarity, comprehension, and collect relevant information.

Cognitive Interview Methodology

We employed purposive sampling procedures to recruit NPs and physicians working in primary care practices in New York State (NYS) (Marshall, 1996). Flyers with study details and researchers' contact information were circulated via e-mail to their primary care professional networks. Participants were eligible if they were either an NP or a physician practicing in a primary care setting and able to speak and read English. Interested PCPs contacted the researchers to arrange the interviews, which took place in a location convenient for participants. One researcher, Allison A. Norful, conducted the interviews and obtained informed consent and permission to audiotape the interviews. A "think-aloud" approach with verbal probing was used (Ericsson & Simon, 1980). The participants were asked to "think aloud" by reporting anything that came to mind as they processed each survey item. Each participant evaluated parts of the question (e.g., the response categories), the question itself, the overall questionnaire, and their own cognitive processes as they responded to each question (Miller, Chepp, Willson, & Padilla, 2014). The interviewer also used verbal probes such as asking participants to explain their responses. Twenty-six PCPs (14 NPs and 12 physicians) were interviewed until data saturation was reached (Sandelowski, 2007), that is, when no new information was provided. The study was approved by the Institutional Review Board of Columbia University Medical Center. Each participant received a \$20 gift card.

Interview audio recordings were transcribed verbatim by a professional transcriptionist. Transcribed data were imported into the qualitative software package, ATLAS.ti (Friede, 2013) and analyzed by two researchers (Poghosyan & Norful, in press). They assigned unique codes to each item, extracted important statements from respondents, and synthesized the data into summaries about how respondents interpreted each question and formulated their answers. The researchers regularly met to discuss items and discrepancies. They compared the summaries across participants to develop themes. They achieved consensus on any modifications of the items, instructions, and response categories to produce final conclusions. Demographic data were entered into SPSS (IBM SPSS Statistics [for Windows], Version 24.0 [IBM Corp, Armonk, NY, USA]) for descriptive analysis.

COGNITIVE TESTING RESULTS

The mean age of the participants was 41.36 years and mean length of experience practicing as a PCP was 10 years. More than half of participants practiced in an urban setting. Length of interviews averaged 45 minutes. During the interviews, we assessed comprehension issues and identified unclear or ambiguous items and those lacking adequate information or being misunderstood by the PCPs. We summarized the findings by synthesizing participants' responses on the tool's instructions, measurement scale, and items on each subscale (Table 2).

Instructions and Response Categories

The instructions, "I am concerned that I did not ..." asked participants to rate their concerns regarding aspects of care they omit on a 4-point Likert scale ranging from "strongly agree" to "strongly disagree." Instructions and response categories were unclear for several participants. Some reported whether they agree if these items were important aspects of care rather than if they omit them. Others attempted to quantify how often they miss each item. For example, one participant said, "the individualizing care ... I like to do it ... I'll say 50% [I do it]." The response categories on the tool were not adequate to capture such quantifications.

Some PCPs reported that certain items might not be applicable to their practice. For example, one participant said, "involve family members in patient care ... that statement just bothers me because a lot of times family members aren't there." Another participant on the same item said, "I am rarely concerned about that. I think that it's up to the patient if they want the family member to be involved."

In addition, the instructions did not specify a timeframe in which the items were missed, thus making it difficult for PCPs to select a response. Based on their feedback, we made the following changes: (a) revised the instructions and added a timeframe [a typical work week], (b) changed the response categories from "strongly agree" to "strongly disagree" to "very frequently" to "never," and (c) added a "not applicable (n/a)" option.

Subscale Modifications

PCPs also provided feedback on each subscale. The items on the Self-Management Support Subscale (SMSS) measured the provision of education and supportive interventions by PCPs

to increase patients' skills and confidence in managing their health (Institute of Medicine, 2003). PCPs agreed that most items were clear, relevant, and easily understood; contained adequate information; and assessed important aspects of care. In addition, they willingly provided their responses. One participant said, "All very important topics that could be easily forgotten."

All items on SMSS, except two, Items 9 and 10 (Table 1), stayed as originally phrased. In Item 9 "individualize care planning," PCPs were not clear whether it referred to care in general or for each visit. Item 10 was intended to measure the development of the care plan collaboratively with patients, yet some PCPs interpreted it as a collaboration with other clinicians rather than with patients. In addition, a new item was added regarding assessing patient knowledge on their care plan as suggested by the participants.

PCPs perceived that items on the follow-up subscale (FUS) measured important aspects of care and were relevant to delivering high-quality care. Some PCPs reported instances when follow-ups were missed. One participant said: "Follow-up on lab tests is interesting, because I think ... often we don't give patients any follow-up ... we say, 'oh, you'll get a call if it's abnormal. If you don't get a call that means it's normal'." Another PCP provided a similar example: "If the patient doesn't call up, they may not be seeing the lab test, the Hepatitis C which I just saw wasn't picked up...And that's an issue." Most PCPs, however, agreed that they more frequently complete follow-up on tests and lab results, but miss follow-up on preventive care activities. One PCP described, "something as simple as counseling on smoking cessation ... you give them [patients] a list of phone numbers to call and you hope that they do it."

A few PCPs expressed concerns about the item regarding following up on referrals (Item 13). One participant said, "I'm not sure what that's alluding to." The interviewer probed by asking, "Can you think of another way to phrase that?" During the discussion, the participant agreed that asking PCPs whether they followed up if the patient completed the referral was a more accurate way to frame the item. Thus, the item was revised.

Two items, Items 16 and 17, were removed, as several PCPs expressed concerns about their clarity. One participant said, "I would say that 5 [Item number 16] is a little vague." PCPs perceived that specific tasks they complete, including the follow-up on tests, referrals, or other activities, ensure continuity of care. Item 6 also was confusing as some perceived it not being part of the follow-up process but rather general patient care.

PCPs agreed that items on the Emotional Health Support Subscale (EHSS) represented important aspects of patient care and were clear, specific, and relevant. One participant said, "We know that the patient's emotional health really plays a lot into how they perceive their health ... the outcomes of their health." A few PCPs found one item on this subscale to be vague. Item 19 asked about providing support to patients when making treatment decisions. One PCP said, "I'd say the most vague here ... I wouldn't know what the question is getting at here in terms of support." The item was revised to specify emotional support. All other items remained unchanged.

Items on the Care Integration Subscale (CIS) measured integrated care for patients across various providers, facilities, and over time to assure patient-centered care. Most items were rated as clear and specific. PCPs perceived these aspects of care as important. Item 27, “Act as a liaison with agencies regarding patient plan of care,” was interpreted differently by PCPs. Some interpreted “agencies” as hospitals whereas others interpreted them as home care agencies. One PCP said, “that would be an example from patient discharge from the hospital making sure that we’re following up with the treatment plan that was done in the hospital.” However, NPs spoke about being unable to help patients with home care. An NP said, “as a nurse practitioner, I cannot even sign home care orders.” This question was subsequently divided into two separate questions—one specifically for hospitals and the other one for community agencies. PCPs also suggested adding a new item on patient care coordination within the healthcare team, as PCPs rely on other team members. Thus we added a new item.

Cognitive Testing Summary

Cognitive testing was a valuable approach to improve the quality of survey measurement. It helped us identify and address validity problems such as participants interpreting the same question differently or in the same way but not in the way intended (Collins, 2003). Cognitive testing improved the validity of the ECOS. Even though most ECOS items are clear, specific, relevant, and easily understandable by PCPs who willingly responded to them, the cognitive interviewing revealed important issues. A few items were interpreted differently by PCPs; thus, they were either revised or removed. We also found that PCPs often attempted to quantify the occurrence of missed care, and the response categories did not adequately capture such quantifications, which were changed. PCPs requested additional instructions to make completing the tool easier, which were added. The ECOS was revised to improve item performance and strengthen the overall scale. We did not find major differences between how NPs and physician PCPs interpreted items. However, NPs were less likely to act as a liaison with home care agencies. Thus, this item was revised. In addition, a “not applicable” response category was added. Revisions in the instructions and response categories, and items in the new version of ECOS, addressed PCPs’ concerns. The final ECOS has 31 items grouped into four subscales.

PILOT TESTING METHODS

After completing cognitive testing, the ECOS went through psychometric testing. We conducted item analysis and internal consistency reliability testing.

Sample and Data Collection

A convenience sample of PCPs was recruited from primary care practices in NYS. We contacted PCPs and practice managers in our professional network to ask for help with recruitment. They assisted by sending e-mail invitations to potential participants who could forward the e-mail to other colleagues (snowball technique) (Sadler, Lee, Lim, & Fullerton, 2010). The invitation explained the study’s purpose and its voluntary nature and contained the link for the online survey developed in Qualtrics Research Suite (Qualtrics, 2014)—a Web-based software for electronic data collection. Qualtrics generated a Web-based link for

participants to complete the survey. We planned to collect data from at least 30 participants—the suggested minimum sample size for pilot testing in initial scale development (Johanson & Brooks, 2010). After 37 PCPs, 19 NPs and 18 physicians, completed the survey, the link was deactivated. Fifteen participants were randomly selected to receive a \$20 gift card. Participants also completed measures of their demographic and work characteristics.

Data Analysis

Descriptive statistics including range, mean, and standard deviation on participant demographic and work characteristics and on ECOS items were computed. Variability of ECOS items was assessed by checking if the full range of each item was observed, indicating optimal variability. Item-total correlations were computed and assessed to check if individual items were consistent with the average behavior of other subscale items. Correlation values <0.2 or 0.3 indicated the item might not correlate well with the overall scale (Everitt & Skrondal, 2002). Internal consistency reliability indicates how well the scale delivered reliable scores. Cronbach's α coefficient is an estimated score of the internal consistency reliability based on all possible correlations between items (Cronbach, 1951). Theoretically, it ranges from 0.0 (no reliability) to 1.0 (perfect reliability) with a desired range between 0.70 and 0.95. In addition, item-deleted Cronbach's α was computed to check whether internal consistency reliability improved without each individual item.

PILOT TESTING RESULTS

Table 3 presents participants' demographic characteristics. PCP mean age was 41.36 years and mean length of experience was 10 years. Almost 30% of PCPs had a doctoral degree. The majority (77%) worked in practices affiliated with a hospital or medical center.

Item analysis results are presented in Table 4. Widely used criteria for retaining or removing items were followed (Nunnally & Bernstein, 1994). We looked for items with limited range and high/low standard deviation in addition to items that did not contribute to internal consistency reliability of the subscales. If the items reduced the reliability, they were candidates for removal. Finally, we looked at item-total correlations (between 0.30 and 0.70), which shows if each item, one at a time, is correlated to the whole scale and if it is related to the other items.

The full range was observed on each item (range 1–5). All items had a wide variability as evidenced by their means and standard deviations. We did not find any items with limited range and high/low standard deviations. The coefficient of reliability (Cronbach's α for SMSS, FUS, EHSS, and CIS were 0.916, 0.813, 0.926, and 0.814, respectively. All values on Cronbach's α were above 0.80 and below 0.95, which indicates good to excellent reliability without warnings of redundant items (DeVellis, 2016). No items were removed after investigating their contribution to Cronbach's α for the subscale.

The inter-item correlation values demonstrate that all items but Items 7 and 13 were correlated above 0.30. Only one item, Item 13, had a borderline correlation ($r = 0.188$) with other items in FUS. However, as this subscale had only five items, at this stage in scale

development, it is recommended to keep the item (Hinkin, 1998), which we did. In addition, Cronbach's α for the overall FUS is 0.813, an acceptable value. Corrected item-total correlations for two items, Items 2 and 3, on SMSS were marginally high ($r > 0.85$), but at this stage were retained. One item on this subscale, Item 7, had borderline inter-item correlation ($r = 0.231$). However, the item contributed to the overall internal consistency reliability of the SMSS; thus, it was retained.

Pilot Testing Summary

At the conclusion of the pilot phase, the four-subscale ECOS is comprised of 31 items, and the number of items in each subscale ranges from 5 to 12. The findings indicate that all items have a full range; they are correlated with other items on each subscale and contribute to internal consistency reliability.

DISCUSSION

The ECOS is the first survey tool to measure errors of omission in primary care and illuminate areas in patient care that require change to improve clinical practice and promote patient safety. We anticipate ECOS will be used in future studies to investigate errors of omission and can help shift the patient safety research paradigm to also focusing on errors of omission, a common challenge in primary care practices. In addition, ECOS can be used in research studies to understand what structures within primary care practices lead to errors of omission to help administrators develop infrastructures to prevent them.

RELEVANCE TO NURSING PRACTICE

As the number of NPs continues to increase in primary care practices, ECOS can be used to guide the care delivery by NPs and promote patient safety in practices with NPs. Being able to measure errors of omission will help make these errors visible to clinicians and administrators and can produce evidence to allow faster recognition, so safety systems can be quickly created and implemented to prevent patient harm.

LIMITATIONS

The study has several limitations. The sample for cognitive interviews was small, and although typical for cognitive interviews, it is possible that other PCPs might interpret the items differently. In addition, given the "think-aloud" approach, it is possible that the presence of the interviewer can impact how PCPs respond. Also, revised items may not perform well. Pilot testing relied on self-report of PCPs, and self-report bias is a concern.

This study demonstrates the first steps of developing and testing a new tool, which is critically important before conducting other psychometric analyses. In order to have a reliable and valid tool, items should be properly designed and tested. We plan to conduct additional testing of the ECOS using data from a large sample of PCPs and applying exploratory and confirmatory factor analyses to provide evidence about its construct validity, refine the subscales, and demonstrate whether each of its subscales will fit a unique factor.

CONCLUSION

The ECOS is the first self-report tool to measure errors of omission from the perspectives of PCPs. Cognitive interviews revealed that most ECOS items were clear, specific, and understandable to PCPs. Initial testing demonstrated acceptable psychometric properties and that ECOS has the potential to be used in research and practice to identify errors of omission that threaten patient safety in primary care. Additional psychometric testing of the ECOS is recommended.

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TABLE 1.**Initial Items on the ECOS**

Item number	SMSS
1	1. Involve family members in patient care
2	2. Educate patients about their illness
3	3. Involve the patient when making treatment decisions
4	4. Engage the patient in shared decision-making
5	5. Educate the patient about weight management
6	6. Counsel on smoking cessation
7	7. Counsel on appropriate physical activity
8	8. Set targets with the patient
9	9. Individualize care planning
10	10. Produce the care plan collaboratively
11	11. Counsel the patient on appropriate diet
	FUS
12	1. Follow up on lab tests
13	2. Follow up on the occurrence of referrals
14	3. Follow up on abnormal findings
15	4. Follow up on adherence to treatment plan
16	5. Provide adequate follow-up support to ensure continuity of care
17	6. Make recommendations for treatment changes if patient is not improving
18	7. Facilitate referrals to specialty care when patients need more intensive care
	EHSS
19	1. Provide support when making treatment decisions
20	2. Address emotional concerns of patients
21	3. Address emotional concerns of families
22	4. Adequately speak to patients about stress management
23	5. Discuss emotional well-being
24	6. Prepare patient for treatments/procedures
25	7. Prepare families for treatments/procedures
	CIS
26	1. Implement referrals to community organizations that offer resources to meet patient needs
27	2. Act as a liaison with agencies regarding patient plan of care
28	3. Integrate knowledge and experience of all team members to inform treatment decisions
29	4. Familiarize myself with patient history prior to visit
30	5. Complete thorough documentation of patient encounter

Note. CIS = Care Integration Subscale; ECOS = Errors of Care Omission Survey; EHSS = Emotional Health Support Subscale; FUS = follow-up subscale; SMSS = Self-Management Support Subscale.

This version of the ECOS was validated in cognitive interviews.

TABLE 2.

Key Themes Emerging from the Cognitive Interviews

Original wording	Reason for revision	Actions taken	Revised wording
Ineffective instructions			
I am concerned that I did not ...	Lack of details and time frame	Addition of details and timeframe	“Think about <i>a typical work week</i> in your practice and provide your opinions. In your best estimate, please indicate the frequency of the following things below that gets missed by you for various reasons.”
Confusing response categories			
Strongly agree Agree Disagree Strongly disagree	Inconsistency in how PCPs selected responses (e.g., agree if these items are important vs. attempt to quantify the frequency of missing them). Certain items do not apply to some patients.	Response category revision addition of “Not applicable” option	Frequently Occasionally Rarely Never Not applicable
Variable interpretation of the items by the participants			
Individualize care planning	Unclear whether for each visit or in general	Revision	“ <i>Individualize the plan of care for each visit</i> ”
Produce the care plan collaboratively	Unclear whether collaboration with patients or with other clinicians	Revision	“ <i>Produce the care plan in collaboration with patients</i> ”
Follow up on the occurrence of referrals	Unclear	Revision	“ <i>Follow up if patients completed the referrals</i> ”
Provide adequate follow-up support to ensure continuity of care	Unclear: specific tasks performed by the PCPs ensured continuity of care	Removal	-
Make recommendations for treatment changes if patient not improving	Not part of follow-up	Removal	-
Provide support when making treatment decisions	Unclear if the support was referring to emotional support	Revision	“ <i>Provide emotional support when making treatment decisions</i> ”
Act as a liaison with agencies regarding patient plan of care	NPs and physicians interpreted “agency” differently (hospital vs. home care)	Revision (separate the question and add new item)	1. “ <i>Act as a liaison with community agencies (e.g., home care) regarding patient plan of care</i> ” 2. “ <i>Act as a liaison with hospitals regarding patient plan of care</i> ”
New items			
	PCPs spoke about the importance of assessing patient knowledge and gathered data about omitting this assessment	Item addition	“ <i>Assess patients’ knowledge about their care plan</i> ”
	PCPs spoke about coordinating patient care within the care team	Item addition	“ <i>Coordinate patient care within the healthcare team</i> ”

Note. NP = nurse practitioner; PCP = primary care provider.

TABLE 3.

Demographics of Participants from Pilot Testing

Participant characteristics	Total (N = 37)	NP (N = 19)	Physician (N = 18)
Gender			
Female N (%)	27 (73)	17 (89.5)	10 (55.6)
Age N (%)			
30–39	18 (48.6)	9 (47.4)	9 (50)
40–49	8 (21.6)	3 (15.8)	5 (27.8)
50–59	7 (18.9)	5 (26.3)	2 (11.1)
>60	4 (10.8)	2 (10.5)	2 (11.1)
Race N (%)			
White	21 (56.8)	13 (68.4)	8 (44.4)
Asian or Pacific Islander	4 (10.8)	1 (5.3)	3 (16.7)
Black or African American	6 (16.2)	2 (10.5)	4 (22.2)
Hispanic	4 (10.8)	2 (10.5)	2 (11.1)
Years of practice experience N (%)			
<1 year	3 (8.1)	3 (15.8)	-
1–4 years	10 (27.0)	3 (15.8)	7 (38.9)
5–9 years	8 (21.6)	6 (31.6)	2 (11.1)
10–14 years	4 (10.8)	1 (5.3)	3 (16.7)
>15 years	12 (32.4)	6 (31.6)	6 (33.3)
Highest educational degree N (%)			
Master's degree	11 (29.7)	11 (57.9)	-
Post-master's certificate	1 (2.7)	1 (5.3)	-
Medical degree (MD/DO)	18 (48.6)	-	18 (100.0)
Doctoral degree (PhD; DIP; PhD/MD)	7 (18.9)	7 (36.8)	-
Practice type N (%)			
Private physician practice	12 (32.4)	6 (31.6)	6 (33.3)
Nurse-managed clinic	1 (2.7)	1 (5.3)	-
Hospital-affiliated practice	11 (29.7)	5 (26.3)	6 (33.3)
University-affiliated clinic	3 (8.1)	1 (5.3)	2 (11.1)
Community health center	10 (27.0)	6 (31.6)	4 (22.2)
Practice setting N (%)			
Urban	25 (67.6)	11 (57.9)	14 (77.8)
Suburban	12 (32.4)	8 (42.1)	4 (22.2)

Note. NP = nurse practitioner.

TABLE 4.**Item Analysis and Reliability Testing**

Item number	Items by subscale	Mean	SD	r^a	Item-deleted Cronbach's α
SMSS (Cronbach's $\alpha = 0.916$)					
1	1. Involve family members in patient care	2.69	1.18	0.519	0.915
2	2. Educate patients about their illness	3.16	1.27	0.877	0.898
3	3. Involve the patient when making treatment decisions	3.28	1.30	0.857	0.899
4	4. Engage the patient in shared decision-making	3.39	1.17	0.841	0.901
5	5. Educate the patient about weight management	3.00	1.34	0.567	0.914
6	6. Counsel on smoking cessation	3.16	1.04	0.483	0.916
7	7. Counsel on appropriate physical activity	2.88	1.02	0.231	0.925
8	8. Set targets with the patient	3.12	1.05	0.584	0.912
9	9. Individualize the plan of care for each visit	3.39	1.33	0.813	0.901
10	10. Produce the care plan in collaboration with the patients	3.32	1.28	0.827	0.901
11	11. Counsel the patient on appropriate diet	3.06	1.12	0.791	0.903
New	12. Assess patient's knowledge about his or her care plan	2.88	1.05	0.468	0.916
FUS (Cronbach's $\alpha = 0.813$)					
12	1. Follow up on lab tests	2.97	1.52	0.681	0.752
13	2. Follow up if the patient completed the referral	2.78	1.01	0.188	0.869
14	3. Follow up on abnormal findings	3.40	1.48	0.738	0.732
15	4. Follow up on adherence to treatment plan	3.19	1.19	0.621	0.774
18	5. Facilitate referrals to specialty care when patients need more intensive care	3.25	1.50	0.795	0.711
EHSS (Cronbach's $\alpha = 0.926$)					
19	1. Provide emotional support when making treatment decisions	3.35	1.17	0.832	0.908
20	2. Address emotional concerns of patients	3.26	1.18	0.850	0.906
21	3. Address emotional concerns of families	3.10	1.08	0.811	0.911
22	4. Adequately speak to patients about stress management	3.06	1.18	0.604	0.931
23	5. Discuss emotional well-being	3.28	1.11	0.791	0.913
24	6. Prepare patient for treatments/procedures	3.07	1.10	0.870	0.905
25	7. Prepare families for treatments/procedures	2.96	1.29	0.646	0.928
CIS (Cronbach's $\alpha = 0.841$)					
26	1. Implement referrals to community organizations that offer resources to meet patient needs	2.71	1.13	0.734	0.798
27	2. Act as a liaison with agencies (e.g., home care) regarding patient plan of care	3.29	1.24	0.613	0.816
New	3. Act as a liaison with hospitals regarding patient plan of care	3.07	1.25	0.433	0.844
28	4. Integrate knowledge and experience of all team members to inform treatment decisions	3.06	1.00	0.815	0.792
New	5. Coordinate patient care within the healthcare team	3.26	1.03	0.749	0.799
29	6. Familiarize myself with patient history prior to visit	3.18	1.26	0.473	0.838
30	7. Complete thorough documentation of patient encounter	3.29	1.49	0.484	0.843

Note. CIS = Care Integration Subscale; EHSS = Emotional Health Support Subscale; FUS = follow-up subscale; SD = standard deviation; SMSS = Self-Management Support Subscale.

^aCorrected item-total correlation. Items did not appear in this order in the questionnaire. The full range (1–5) was observed on all items.

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