Further Psychometric Testing and Validation of the Errors of Care Omission Survey (ECOS)

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Inclusive Dates:

07/01/2016 to 09/30/2018

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Acknowledgement of Support:

This work was supported by the Agency for Healthcare Research and Quality, R03 HS024758.

STRUCTURED ABSTRACT

Purpose

To determine the factorial structure of Errors of Care Omission Survey (ECOS) and finalize the subscales measuring care omission domains.

Scope

Although a large proportion of healthcare is delivered in primary care settings, research on patient safety in primary care has lagged behind that of acute care. Most studies on patient safety focus on errors of commission rather than errors of omission. Errors of omission are difficult to identify and measure. ECOS is a survey tool designed to measure errors of omission in primary care.

Methods

A cross-sectional survey design was used to collect data from primary care providers (PCPs), both physicians and NPs, in New York. ECOS was administered and psychometric testing of the ECOS was conducted.

Results

Using data from PCPs, the 24-item ECOS has a four-factor structure with subscales exhibiting acceptable internal consistency reliability. Final ECOS has four subscales: Patient Self-Management Subscale (PSMS), Family Engagement Subscale (FES), Follow-Up Subscale (FUS), and Care Integration Subscale (CIS). We found that reducing the number of ECOS items produces a reliable and concise tool to enhance the measurement of omissions and ease the tool's completion.

Key Words

Primary care; patient safety; nurse practitioners; physicians

PURPOSE

There were three objectives in this study:

1) Determine the factorial structure of Errors of Care Omission Survey (ECOS) and finalize the subscales measuring care omission domains.
2) Investigate performance of the items in ECOS using Item Response Theory (IRT) models.
3) Examine whether the items on each ECOS subscale measure the intended construct by fitting data from different primary care providers (PCPs) utilizing Confirmatory Factor Analysis (CFA).

SCOPE

Background

Although a large proportion of healthcare is delivered in primary care settings, research on patient safety in primary care has lagged behind that of acute care.[1-3] Patient safety issues occur as or more frequently in primary care as in inpatient settings[4] but are not well studied or categorized.[5-9] Moreover, studies of patient safety mainly focus on errors of commission[6,10-13]—doing something wrong, such as administering wrong medication[11,14,15] or giving wrong diagnoses[10,12,16] —as opposed to errors of omission[13,17,18]—failure of action, such as missed care or follow up. These acts of omission[19-21] have been conceptualized in the healthcare literature as "care omission,"[22-25] "tasks left undone,"[26,27] or "missed care"[21,28-31] and can occur because of time pressures, prioritizing urgent health needs, and poor organizational structures.[32-34] The Agency for Healthcare Research and Quality (AHRQ)[35] states that, although errors of omission occur more frequently than errors of commission, they are not well recognized or measured.[36]

Context

Our study is the first of its kind to validate a tool that measures perceptions of different PCPs. This is particularly important as the NP role is expanding in primary care,[37] and the delivery of primary care is transforming into care delivered in teams. Though team-based care is beneficial for patients, possibilities to miss aspects of care may increase as team members attempt to clarify their roles or assume that others are delivering certain aspects of care.[38] Our tool is innovative in its potential to identify possible care omissions in primary care teams to promote optimal care delivery.

The Errors of Care Omission Survey (ECOS) is the only known tool designed to measure certain omissions in primary care from the perspectives of PCPs, both physicians and NPs.[39]

The original version of the ECOS had 31 items that were developed through extensive literature review, content analysis of existing tools, cognitive interviews with PCPs, and initial psychometric testing. It measures critical patient care tasks and asks PCPs to report the frequency of missing each item on a 5-point scale ranging from "very frequently" to "never" and includes a "not applicable" option. Content validity was established through cognitive interviews with PCPs and primary care experts.[39]

Items on the original ECOS were grouped into the following four subscales measuring the domains of omitted care and have acceptable internal consistency reliability: 1) Self-Management Support Subscale (SMSS) includes 12 items measuring the provision of education and supportive interventions by PCPs to increase patients' skills and confidence in managing their own health (e.g., "Engage the patient in shared decision making"); 2) Follow-up Subscale (FUS) contains five items measuring the frequency of which PCPs follow-up with patients about their test results, referrals, or treatment plan (e.g., "Follow up if the patient completed the referral"); 3) Emotional Health Support Subscale (EHSS) encompasses seven items measuring the frequency of emotional health support offered to patients and their families, such as "addressing their emotional concerns" or "discussing their emotional well-being"; and 4) Care Integration Subscale (CIS) has seven items measures integrated care for patients across various providers and acilities, and over time, to ensure patient-centered care (e.g., "Implement referrals to community organizations that offer resources to meet patient needs"). Through each step of the tool development, evidence was produced about the validity and the reliability of ECOS items and subscales.

Settings

Our study involves primary care settings in the state of New York.

Participants

The participants in this study include PCPs (physicians and NPs) in New York.

Incidence

Not applicable to our study

Prevalence

Not applicable to our study.

METHODS

Study Design

A cross-sectional survey design was used to collect data from PCPs (physicians and NPs) in New York.

Data Sources/Collection

We extracted contact information of PCPs from the SK&A database,[40] which contains information on nearly the entire population of ambulatory-based providers in the U.S. and is the most complete resource of its kind. Contact information from a total of 1,592 physicians and 1,590 NPs was extracted, and mail surveys were sent to all 3,182 PCPs. Mail surveys were sent to PCPs using their practice location addresses. A letter and consent form accompanied the survey, which described the study, its voluntary nature, and the confidentiality of responses. PCPs completed the survey and returned it in an enclosed prepaid envelope to the research team. To encourage maximum response rate, a postcard reminder was sent to non-respondents 2 weeks after the initial mailing and then a second mail survey was sent to non-respondents.[41] The data collection took place Summer-Fall 2017.

Interventions

Not applicable to our study.

Measures

The survey collected relevant demographic information such as age, sex, education, and race and was tailored for physicians and NPs. For example, physicians received a survey specific to medical education, but the NPs received a survey inquiring about their nursing education. The survey also contained the 31-item Errors of Care Omission Survey (ECOS). ECOS items were presented in random order and not within pre-determined subscales.

Limitations

This study relied on PCP self-report which means clinicians can either under or over report omissions. In addition, PCPs only from one U.S. state participated; thus, the findings might not be applicable to PCPs in other U.S. states or internationally. Furthermore, the ECOS itself has some limitations that should be taken into account in future testing.

RESULTS

Before conducting the Exploratory Factor Analysis (EFA), we examined data for multicollinearity based on variance inflation factor (VIF). We subsequently conducted EFA to demonstrate whether the items on four subscales will load on separate factors or a new structure will emerge from the data. We ran several models in which the factors corresponded to each omission domain, and we also allowed the factors to emerge from the data. Then, we determined the number of factors to be extracted by evaluating model fit. The rotation that yielded the most meaningful results both conceptually and empirically was retained. To conduct reliability testing and remove redundant items, we calculated the coefficient of internal consistency reliability (Cronbach's α) for each ECOS subscale. We repeated the above procedures of EFA and reliability testing until the final model was reached.

Principal Findings

After testing EFA models with one to six factors and comparing results from different rotations, a four-factor model with target rotation was selected, as it had the best empirical and conceptual fit to the data. This model is also fitted in confirmatory factor analysis to produce evidence about the construct validity of ECOS. The four-factor model had an adequate number of items with significant loadings on each factor that were also conceptually consistent and exhibited acceptable fit. Based on subgroup analyses, the models performed similarly for both samples—physicians and NPs—and had similar patterns with minor differences.

After the factor analyses, 24 items with four subscales represent the final ECOS. The items on each subscale had wide ranges and acceptable correlation with the total of the remaining items providing evidence about each item's ability to capture the full range of the construct and the item's conceptual coherence with other items on the subscale.

Twelve items loaded on Factor 1; these items belonged to original SMSS and EHS. However, three items from these original subscales loaded on a separate factor (Factor 2). These items measured aspects of family involvement in patient care. Thus, the original SMSS and EHS were renamed to separate the items focusing on the aspects of care on assisting patients to manage their own health from those regarding families' involvement in patient care. Factor 1 was labeled as Patient Self-Management Subscale (PSMS) and Factor 2 was labeled as Family Engagement Subscale (FES). In addition, two items from the original SMSS were removed because they were deemed redundant. Almost all items on PSMS had strong factor loadings. All three items of FES had strong factor loadings. FES also had good internal consistency reliability.

Four items loaded on Factor 3 with significant loadings consistent with the original FUS. This subscale exhibited ideal reliability.

Item 14, “Follow up if the patient completed the referral,” had a significant loading on FUS as well as on Factor 4. Given the scale development stage and that the item was consistently meaningful with other items in the FUS, we decided to include Item 14 in the FUS. There were five items with significant loadings on Factor 4 corresponding to the original CIS. Two items (4 and 31), “Implement referrals to community organizations that offer resources to meet patient needs” and “Coordinate patient care within the healthcare team,” had similar significant loadings on this factor as well as on Factor 3 (FUS). One item, 10, “Integrate knowledge and experience of all team members to inform treatment decisions,” had similar significant loadings on this subscale as well as on Factor 1 (PSMS). However, none of these three items had strong loadings on Factor 3 or Factor 1. Given that these items were conceptually consistent with the other items on CIS and had significant factor loadings on Factor 4, we included them in Factor 4 corresponding to CIS. Two items originally from CIS were removed, because they did not load significantly on the factor. This subscale also had acceptable reliability.

Discussion

We have conducted further psychometric testing of ECOS, which measures critical omissions in primary care from the perspectives of physicians and NPs. We explored the tool’s factorial structure, assessed whether the reduced item set fits the data from practicing PCPs, and produced evidence of its reliability and validity. Using data from PCPs, the 24-item ECOS has a four-factor structure with subscales exhibiting acceptable internal consistency reliability. This model is also being fit in a confirmatory factor analysis to produce evidence about the validity of ECOS. In addition, these remaining 24 items are also going through item response theory testing to create a short and reliable tool. The items measuring the aspects of family involvement in patient care, originally part of SMSS, were separate from the other aspects of care focused on supporting patients to manage their own health.

This finding suggests that conceptually PCPs separate patient and family involvement in care, and different strategies should be implemented to enhance patient self-management and family engagement. In addition, we found that reducing the number of ECOS items produces a reliable and concise tool to enhance the measurement of omissions and ease the tool's completion.

At this stage of the tool, ECOS has 24 items and some of the items exhibit multicollinearity concerns. Thus, the next step of our future analysis will involve IRT models which should help to identify those items and create a short and precise instrument.

Conclusions

This study provided evidence supporting the factorial structure of ECOS and its use in research and practice to measure omissions threatening patient safety in primary care. Further psychometric testing is recommended with diverse samples of PCPs and across different settings.

Significance

ECOS is an important tool that can be used to measure omissions in primary care, and we anticipate it will be valuable for clinicians, administrators, and researchers. Given the known value of PCP input, ECOS can help gather this important information about aspects of patient care that are often omitted but not often captured in traditional reporting systems. This evidence will help to understand what care is being routinely missed, the potential risks to patients, and how to minimize and eliminate these occurrences. Faster recognition of omissions can prevent patient harm by quickly creating and implementing preventive strategies and safety systems.

ECOS is capable of measuring four domains of omitted care, such as supporting patients to manage their own health, engaging patients' families into patient care, following up with patients, and integrating various aspects of care.

Measuring the significance of each domain will allow their faster recognition and lead to designing decision-making and reminder tools to ensure that all aspects of primary care are delivered to patients, as these care domains are critical for ensuring patient safety. In terms of team-based care, the authors of a recent review emphasized that in order to transform patient safety, care integration issues should be addressed as poor care integration is linked to adverse events and threatens patient safety.[42] ECOS can be used to identify the aspects of care integration that are left uncoordinated, and actions can be taken accordingly by clinicians, administrators, or staff to enhance care integration.

Implications

ECOS can also be used to measure omissions in various primary care practices, compare them, and find factors that lead to omissions. ECOS can make errors of omissions visible and aid actions to prevent them before they result in patient harm. Researchers can also assess the impact of organizational attributes, such as the relationship PCPs have with staff and other team members, support PCPs receive for care delivery, or structural capabilities, such as presence of reminder systems or decision support tools in practices on the occurrence of omissions. For example, a standardized software-assisted system implemented in hospitals reduced omissions.[43] ECOS can be used to conduct similar studies in primary care to produce evidence and actions then can be taken to address these organizational and structural deficiencies to prevent omissions. In addition, ECOS can be used in future research to determine the impact of omissions on patient outcomes, such as preventable hospitalizations or emergency department visits for conditions that should not result in these negative outcomes if all necessary primary care is delivered to patients.[44] Thus, ECOS holds the potential to provide evidence to improve clinical practice, illuminate areas in care delivery that require attention and change, and promote future patient safety research.

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LIST OF PUBLICATIONS AND PRODUCTS

Publications

Poghosyan, L, Norful, AA, Ghaffari, A, Liu, J (In Press). Psychometric testing of Errors of Care Omission Survey: a new tool on patient safety in primary care. J Patient Saf, Forthcoming 2019.