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Validating Performance of a Hospital Discharge Planning Decision Tool in Community Hospitals

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ABSTRACT

Purpose of Study: The Early Screen for Discharge Planning (ESDP) is a decision support tool developed in an urban academic medical center. High ESDP scores identify patients with nonroutine discharge plans who would benefit from early discharge planning intervention. We aimed to determine the predictive performance of the ESDP in a different practice setting.

Primary Practice Setting: Rural regional community hospital.

Methodology and Sample: We designed a comparative, descriptive survey study and enrolled a convenience sample of 222 patients (identified at admission) who provided informed consent. Sample characteristics and ESDP scores were collected during enrollment. The Problems After Discharge Questionnaire, EuroQoL-5Dimensions quality-of-life measure, length of stay, and use of post-acute care services were recorded after discharge. We compared outcomes between patients with low and high ESDP scores.

Results: More than half of the sample (51.8%) had a high ESDP score. Patients with high ESDP scores reported more problems after discharge ($p = .02$), reported lower quality of life ($p < .001$), had longer length of stays ($p = .04$), and used post-acute care services ($p = .006$) more than patients with low ESDP scores. The difference in the average percentage of unmet needs was not statistically significant ($p = .12$), but patients with high ESDP scores reported more unmet needs than patients with low ESDP scores.

Implications for Case Management Practice: The value of systematically proactive approaches to discharge planning is increasingly recognized, but establishing the performance capacity of support tools is critical for optimizing benefit. These study findings support use of the ESDP in regional community hospitals, making it a useful, open-source decision support tool for various health care delivery systems.

Key words: *community hospitals, decision support techniques, hospitalization, patient discharge, rural hospitals*

It takes time to design and implement a comprehensive discharge plan for hospitalized patients with complex discharge planning (DP) needs. Identifying these patients early in their hospital stay maximizes the time to organize and execute a multifaceted plan. Our prior work in populations of adults hospitalized in academic medical centers shows that, when hospital DP personnel are engaged early in the hospital stay, the timely organization, engagement, and coordination of services (needed to improve continuity of care, patient safety, and resource use) are enhanced, length of stay is decreased, and fewer unmet needs are self-reported after discharge. Conversely, when DP is not prioritized early in the hospital stay, our research confirms that patients return home with unmet needs and subsequent readmissions increase (Bowles, Hanlon, Holland, Potashnik, & Topaz, 2014; Holland & Hemann, 2011; Holland, Knafl, & Bowles, 2013).

Systematic screening is the first of two essential decision points in the DP process (Medicare and Medicaid programs, 1994; Potthoff, Kane, & Franco, 1997). The Medicare Conditions of Participation emphasize identifying "…at an early stage of hospitalization all patients who are likely to suffer adverse health consequences upon discharge if there is no adequate discharge planning" (Centers for Medicare & Medicaid Services, 2013). This suggests that a subset of patients whose discharge plans are not routine exists (Domanski, Jackson, Miller, & Jeffrey, 2003), and these patients may require a type of specialized DP services for comprehensive evaluation beyond the scope of the direct care staff roles. Additional involvement by experts in roles designed

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for coordination of complex care across settings (e.g., DP nurses and social workers) is common (Holland, Harris, Leibson, Pankratz, & Krichbaum, 2006). Discharge planning experts have the experience, skills, and competencies of a high-level practitioner. A master's degree in their respective discipline is often required. Additional experience in community care or public health is a plus.

The second important decision point in the DP process establishes the appropriate post-hospital discharge destination necessary to successfully address the patient's continuing care needs, treatment preferences, and goals of care. Researchers of DP screening tools have focused exclusively on this second point, and little attention has been given to early identification of patients whose discharge plans will benefit from specialized DP services. Without early recognition of patients who would benefit from involvement of DP experts, such experts are not involved in the process in a timely fashion, resulting in abbreviated time to successfully address complex continuing care needs. Furthermore, outcomes associated with the second decision may very well be dependent on the first key decision—whether expert DP personnel become involved in the planning and implementation of the patient's discharge plan.

Background

A few empirically based screens identified in the DP literature have focused on the second decision point (use of post-acute care services). Some limitations to screening exist in practice because certain types of hospitalized adults are excluded (e.g., surgical patients, nonverbal patients, patients in intensive care units, and patients younger than 55 years or older than 85 years; Blaylock & Cason, 1992; Bowles et al, 2009; Evans, Hendricks, Lawrence, & Bishop, 1988; Fairchild et al., 1998). The Blaylock Risk Assessment Screen identifies only elderly hospitalized patients at risk of longer lengths of stay and more frequent readmissions (Blaylock & Cason, 1992). The Discharge Decision Support System was designed specifically to predict which hospitalized adults 55 years or older would be referred to post-acute care services (Bowles et al., 2009).

Researchers of DP screening tools have focused exclusively on this second point, and little attention has been given to early identification of patients whose discharge plans will benefit from specialized DP services.

Two other screens with end points of interest to DP exist, although they were not designed specifically as DP decision tools. The Hospital Admission Risk Profile is an instrument that stratifies patients 65 years or older at hospital admission according to the risk of developing a new activities of daily living disability (Sager et al., 1996). Evans et al. (1988) designed a screen almost three decades ago in a sample of veterans to identify adult patients at risk of longer lengths of stay, nursing home placement, and readmission. The focused end points of these screens are linked to the second DP decision point, rather than the early involvement of hospital DP experts to assist in the DP process.

The BOOSTing Care Transitions program (Society of Hospital Medicine, 2016) recognized that there are no externally validated tools to risk-stratify adult patients transitioning out of the hospital. It compiled a user-friendly risk tool with seven variables: use of problem medications, depression, specific principal diagnoses, polypharmacy, poor health literacy, absence of support, and hospitalization in the past 6 months (Society of Hospital Medicine, 2016). Its protocol suggests that if any one of these factors exists, risk-specific interventions should be considered. However, a problem with the screening tool is that nearly every hospitalized patient is positive for at least one factor.

In contrast, the Early Screen for Discharge Planning (ESDP), which considers a limited number of characteristics readily available early in the hospital stay, was developed and validated as a DP screen with the specific purpose of supporting the first critical decision point—early engagement of expert DP personnel (Holland et al., 2006). This allows DP resources to be leveraged to patients who may need complex DP, regardless of their need for formal post-acute care services. For example, a patient with significant care needs may have a strong family or informal support system that can provide all the necessary care. Nevertheless, such patients still need expertise with planning to successfully meet complex care needs.

How well a clinical decision tool performs depends on the nature of the individuals being evaluated and the circumstances in which they are being evaluated (Norman & Streiner, 2000). Institution-specific attributes (e.g., bed size, teaching status, rural or urban location) and patient characteristics (e.g., age, severity of illness, socioeconomic status, functional status) can create variability in the performance of predictive models (Casarett, 2001; Khuri et al., 2001). Academic medical centers are often larger than community hospitals, are often located in urban areas, are more frequently associated with tertiary care centers, and have easier access to multiple

subspecialists and specialized technology. In contrast, community hospitals usually focus on primary outpatient care and have limited inpatient care and very limited subspecialty care. Nevertheless, community hospitals may still benefit from using decision support tools even if they are developed in the markedly different context of an academic medical center.

Decision support tools should be validated before they are adopted; that is, verify that it performs as expected within populations and settings of interest (Shapiro, 2005). The purpose of this study was to examine the performance of the ESDP in a regional community hospital. The central hypothesis of this study was that in a regional community hospital setting, the ESDP could differentiate between patients who would and would not benefit from early intervention by hospital DP personnel. We tested our central hypothesis with the following specific aims:

1. Compare the percentages of reported problems and unmet continuing care needs of regional community hospital patients with high versus low ESDP scores.
2. Compare self-reported quality of life of regional community hospital patients with high versus low ESDP scores.
3. Compare length of stay and number of referrals to post-acute care services of regional community hospital patients with high versus low ESDP scores.

We hypothesized that, similar to patients in academic medical settings, patients in a regional community hospital with high ESDP scores would have higher percentages of problems, unmet continuing care needs, and lower quality of life in the first few weeks after discharge, compared with patients with low ESDP scores. We further hypothesized that high-scoring patients would have longer lengths of stay and more referrals to post-acute care services.

Methods

Study Design

A comparative, descriptive survey design was used to address the specific aims. This study was approved by the institutional review board. All patients provided written, informed consent.

Participants

The study targeted adults hospitalized for various medical and surgical conditions. The sample was limited to adults who were returning home in the community because we were primarily interested in the problems and unmet needs that arose during the recovery period at home. Inclusion criteria were patients aged 18 years or older; able to read and speak English; and returning home to the community after discharge. We excluded patients discharged to facility care, including jail or prison, and pregnant women because those patients have different discharge needs compared with the usual population of adults hospitalized for medical or surgical reasons who then return home to the community. Because problems and unmet needs are self-reported, patients with dementia identified in the health record were also excluded.

Patients were recruited from hospital daily admission lists. All adult patients were reviewed for study eligibility by the study coordinator within 48 hours of admission. To enhance the generalizability of the results, the sample was stratified on the basis of 2010 national estimates of age categories for hospitalized adults (Agency for Healthcare Research and Quality, n.d.). On the basis of the mean number of problems and standard deviation from prior studies of the ESDP, a total of 138 patients were required to detect the difference in the number of problems as statistically significant using a two-sample *t* test with approximately 80% power and a significance level of .05. Because some outcomes were measured approximately 1 week after hospital discharge, and because prior studies utilizing similar methods showed a 75% response rate after being discharged back to the community (Holland et al., 2013), the final sample size was inflated to account for patients lost to follow-up.

Setting

The sample was accrued from inpatients receiving care in a rural regional community hospital that is part of a large health care system in the Midwest. The hospital has 304 beds, averages about 10,500 adult admissions annually, and employs approximately 220 physicians. It is located in a small county; the 2011 Census Bureau estimates the local population to be just under 100,000. At the time of the study, no DP decision support tool was in use.

Instruments and Measures

The ESDP was developed and prospectively validated using two large, independent samples of adults hospitalized for either medical or surgical reasons in an academic medical center. The four variables of the ESDP are available from routine hospital admission clinical data (walking limitation, age, living alone before admission, and level of disability). The variables and the scoring algorithm have been published elsewhere (Holland et al., 2006). The ESDP has high sensitivity and specificity (area under the receiver operating curves was 0.82 and 0.84, respectively) in

identifying patients in academic medical center hospitals who should receive targeted attention from a DP expert (Holland & Hemann, 2011). Possible ESDP scores range from 0 to 23 (with higher scores denoting higher risk). A high score, defined as 10 or greater, triggers the DP expert to conduct a focused, in-depth evaluation of the patient's post-acute care needs. The study coordinator collected the ESDP data after the patient gave consent.

The Problems After Discharge Questionnaire–English Version (PADQ-E) is a structured questionnaire constructed for DP research (Holland, Mistiaen, Knafl, & Bowles, 2011). The instrument measures important but often overlooked patient factors that contribute to a poor post-acute care recovery experience and likely influence readmission (Calvillo-King et al., 2013; Committee on Living Well with Chronic Disease, 2012; Robert Wood Johnson Foundation, 2011). A "problem" was defined as any worry, limitation, concern, or difficulty reported by the patient. An unmet need was defined as a patient-reported need for help that is inadequately met. The 36-items survey spans seven domains: personal care, household activities, mobility, equipment, instructions, physical function, and psychosocial function. Problems and unmet needs are reported as "any at all," and average numbers are reported (overall and for each domain). It is reliable when self-administered or completed by interview. Internal consistency of the subscales measured by Cronbach's α ranged from 0.74 to 0.91 (Holland et al., 2011).

The EuroQoL-5Dimensions (EQ-5D; EuroQol Research Foundation, n.d.) is a standardized instrument used to measure health status. The EQ-5D comprises five dimensions of health (mobility, self-care, usual activities, pain or discomfort, and anxiety or depression) with three levels (some, moderate, and extreme problems) (Roset, Badia, & Mayo, 1999). Applicable to a wide range of health conditions and treatments, it provides a simple descriptive profile and a single index value for health status that can be used in the clinical and economic evaluations of health care (Brooks, 1996; Dolan, 1997; EuroQol Research Foundation, n.d.). Hospital length of stay was obtained from an administrative database. Referrals to post-acute care services such as home health care were obtained by health record review. Receipt of post-acute care services, as indicated by referral, was verified by patient self-report after discharge.

Study Procedures

After receiving institutional review board approval, the site investigator (C.B.) and the study coordinator were trained in study procedures using role-playing and case studies from the principal investigator's prior work until the study coordinator achieved 100% agreement with the site investigator's assessment. Interrater reliability between the study coordinator and the site investigator was assessed on the first five patients enrolled and then randomly checked once per month. The goal of 100% agreement was achieved. Fidelity to data collection procedures was monitored weekly during the first month and then monthly thereafter, ensuring that the data were collected as outlined in the study procedures. Fidelity to study procedures was enhanced through close contact with the principal investigator by weekly meetings via visual and audioconferencing.

Subject Recruitment

The study coordinator received daily lists of hospital admissions. Eligible patients were identified through discussion with clinicians, and patients were then approached for enrollment. The study coordinator used a script to review the study information with the patient and to facilitate obtaining informed consent. Inclusion criteria were confirmed by record review after consent was obtained.

Data Collection

After enrollment, sample characteristics and ESDP data were collected via in-person interview and health record review by the study coordinator. Patients and clinicians were asked at that time whether the patient would be discharged back home to the community. Discharge disposition was monitored throughout the hospitalization, although care was taken to not disrupt usual DP practices. If the patient's post-acute care disposition changed to facility care, the PADQ-E and the EQ-5D were not mailed. The patient's All Patient Refined Diagnosis Related Group Severity of Illness (APR-DRG-SOL) was obtained after discharge from an administrative database. The APR-DRG-SOL expands the DRG structure by incorporating subclasses that address patient differences that relate to severity of illness (Shafrin, 2012).

The PADQ-E and the EQ-5D were either mailed 1 week after discharge or completed by a phone call, depending on patient preference. Patients were also asked about any post-acute care services that they received after hospital discharge to verify the referral to services received. Data were entered into a web-based REDCap database. The principal investigator monitored the data entry for quality and timeliness.

Data Analysis

We used descriptive statistics to summarize sample demographic and clinical characteristics and describe

the data by groups. Continuous variables were summarized with means, standard deviations, medians, and ranges; categorical variables were summarized using frequency counts and percentages. Demographic and clinical features were compared between patients who completed the study, were lost to follow-up, and whose discharge disposition changed from home to facility care. In addition, comparisons of demographic and clinical features were made between participants with low (<10) and high (≥10) ESDP scores using two-sample *t*, Wilcoxon's rank sum, χ^2, Fisher's exact, and Cochran–Armitage trend tests, as appropriate.

The percentages of problems and unmet needs (Aim 1) were described using means, medians, standard deviation, and range for the two groups (low vs. high ESDP scores). Comparisons of the percentages of reported problems and unmet needs between participants with low and high ESDP scores were evaluated using two-sample *t* or Wilcoxon's rank sum tests, as appropriate. Quality of life after hospital discharge (Aim 2) was described using frequency counts and percentages for the two groups (low vs. high ESDP scores) for each of the five EQ-5D dimensions of health (with each dimension being scored as no problems, some problems, or severe problems). These dimensions were compared between participants with low and high ESDP scores using Cochran–Armitage trend tests. For Aim 3, hospital length of stay and the number of referrals to post-acute care services were described using means, standard deviation, medians, and range for the two groups (low vs. high ESDP scores). These variables were compared between participants with low and high ESDP scores using two-sample *t* and Wilcoxon's rank sum tests, as appropriate. All tests were two-sided, and *p* values less than .05 were considered statistically significant. Statistical analyses were performed using SAS 9.3 statistical software (SAS Institute Inc., Cary, NC).

Results

Sample Demographic and Clinical Characteristics

There were 222 adult patients enrolled in the study. All patients were non-Hispanic white, except for one. Gender was relatively evenly split (46.9% male, 53.2% female). The sample was stratified by 2010 national estimates of age categories for hospitalized adults (Agency for Healthcare Research and Quality, n.d.). The overall average age was 61.7 ± 16.9 years. The ESDP score was 10 or greater for 115 patients (51.8%). Thirty-one patients (14.0%) initially planned to return to their home in the community but ultimately were transferred to a nursing facility at time of discharge. Forty-three (19.4%) did not return the questionnaires and were lost to follow-up; 148 (66.7%) completed the study, exceeding the number required by the a priori power calculation ($n = 138$). Patients lost to follow-up were on average younger and had a lower ESDP score than those who completed the questionnaire; patients whose disposition changed to facility placement were on average older and had higher ESDP scores (see Table 1).

Aim 1: Problems and Unmet Continuing Care Needs

Table 2 compares ratings of problems and unmet needs among high- and low-scoring patients. Patients with high ESDP scores had a statistically significant higher average percentage of problems overall after discharge than patients with low ESDP scores (34.1 ± 18.9 vs. 26.3 ± 15.6; $p = .02$). Of the five subscales of problem categories in the PADQ-E, high ESDP-scoring patients had significantly more problems with personal care (20.6 ± 24.9 vs. 6.8 ± 17.8; $p < .001$), household activities (52.6 ± 40.4 vs. 27.6 ± 35.6; $p < .001$), and mobility (34.0 ± 31.8 vs. 15.7 ± 23.8; $p < .001$). Finally, although high ESDP-scoring patients reported more physical and psychological concerns on the PADQ-E, the differences between groups was not statistically significant ($p = .07$ and $p = .14$, respectively).

Although the average percentage of unmet needs overall after discharge of high ESDP-scoring patients was higher than that of low ESDP-scoring patients, the difference was not statistically significant ($p = .12$). Patients with high ESDP scores also had higher average percentages of unmet needs in four of the five problem subscales of the PADQ-E. The personal care subscale was the exception—high-scoring patients reported a slightly lower average percentage of unmet needs than low-scoring patients (1.3 ± 6.8 vs. 1.9 ± 10.2; $p = .66$).

Aim 2: Self-Reported Quality of Life

Table 3 compares quality of life among high- and low-scoring patients. Patients with high ESDP scores had statistically significantly lower average EQ-5D scores after discharge across all five dimensions (mobility, $p < .001$; self-care, $p = .006$; usual activities, $p = .006$; pain or discomfort, $p < .001$; anxiety or depression, $p = .03$), as well as a lower health index raw score overall ($p < .001$). Patients with high ESDP scores also had lower average scores on the summary health index of the EQ-5D, but the difference was not statistically significant ($p = .05$).

Aim 3: Length of Stay and Referrals to Post-Acute Care Services

Table 4 compares length of stay and use of post-acute care services among high- and low-scoring patients.

TABLE 1
Group Differences in Demographic and Clinical Characteristics

Characteristics[a]	Overall (N = 222)	Completed Study (n = 148)	Lost to Follow-Up (n = 43)	Discharge Disposition Changed to Facility Placement (n = 31)	p^b	p^c
Age, years	61.7 ± 16.9	62.6 ± 15.7	51.4 ± 16.6	71.6 ± 16.4	<.001	<.001
	61.5 (49–76)	63.5 (52.5–75)	51 (35–61)	78 (58–87)		
No. of comorbid conditions	4.8 ± 3.8	4.6 ± 3.6	4.2 ± 3.4	6.7 ± 4.7	.045	.65
	4 (2–7)	4 (2–7)	4 (1–7)	6 (3–10)		
No. of medications	9.2 ± 5.6	8.7 ± 5.4	9.4 ± 5.4	11.2 ± 6.9	.22	.50
	9 (5–13)	8 (5–12)	9 (6–12)	10 (6–16)		
APR-DRG-SOL score	2.2 ± 0.8	2.1 ± 0.8	2.2 ± 0.8	2.5 ± 0.9	.05	.43
	2 (2–3)	2 (1–3)	2 (2–3)	3 (2–3)		
ESDP score	9.8 ±5.4	9.7 ± 5.3	8.6 ± 5.6	12.2 ± 4.6	.01	.20
	10 (6–14)	9 (6–14)	7 (4–13)	11 (9–16)		
ESDP score group					.03	.86
<10	107 (48.2)	76 (51.4)	23 (53.5)	8 (25.8)		
≥10	115 (51.8)	72 (48.6)	20 (46.5)	23 (74.2)		
Sex					.07	.06
Male	104 (46.8)	72 (48.6)	14 (32.6)	18 (58.1)		
Female	118 (53.2)	76 (51.4)	29 (67.4)	13 (41.9)		
Ethnicity (n = 220)					.14	NA
Non-Hispanic White	219 (99.5)	147 (100)	43 (100)	29 (96.7)		
Latino or Hispanic	1 (0.5)	0 (0)	0 (0)	1 (3.3)		
Race					.19	.31
White	211 (95.0)	143 (96.6)	40 (93.0)	28 (90.3)		
Black	0 (0)	0 (0)	0 (0)	0 (0)		
Asian	1 (0.5)	1 (0.7)	0 (0)	0 (0)		
American Indian or Alaskan Native	5 (2.3)	3 (2.0)	1 (2.3)	1 (3.2)		
Other	5 (2.3)	1 (0.7)	2 (4.7)	2 (6.5)		
Education (n = 212)					.48	.87
High school incomplete	14 (6.6)	11 (7.5)	3 (7.0)	0 (0.0)		
High school complete	81 (38.2)	52 (35.6)	15 (34.9)	14 (60.9)		
Post-high school	117 (55.2)	83 (56.9)	25 (58.1)	9 (39.1)		
Type of admission					.02	.007
Medical	163 (73.4)	100 (67.6)	38 (88.4)	25 (80.6)		
Surgical	59 (26.6)	48 (32.4)	5 (11.6)	6 (19.4)		
Insurance (n = 221)					<.001	<.001
Medicare (with anything else)	114 (51.6)	78 (52.7)	14 (32.6)	22 (73.3)		
Medicaid (only)	26 (11.8)	10 (6.8)	13 (30.2)	3 (10.0)		
Self-pay	5 (2.3)	2 (1.3)	2 (4.7)	1 (3.3)		
Private insurance	76 (34.2)	58 (39.2)	14 (32.6)	4 (13.3)		

Note. APR-DRG-SOL = All Patient Refined Diagnosis Related Group Severity of Illness; ESDP = Early Screen for Discharge Planning; NA = not applicable.
[a]Data are presented as mean ± *SD*, median (interquartile range), or No. (%). Percentages may not sum to 100 because of rounding.
[b]Comparison among the completed, lost to follow-up, and changed discharge disposition groups.
[c]Comparison between the completed and lost to follow-up groups.

Patients with high scores on the ESDP had a statistically significantly longer average length of stay than low-scoring patients (5.0 ± 6.1 vs. 3.7 ± 1.8; p = .04). A statistically significantly greater percentage of patients with high scores on the ESDP used post-acute care services than patients in the low-scoring group (n = 34 [30.6%] vs. n = 15 [14.4%]; p = .006).

TABLE 2
PADQ-E Subscale and Total Score Differences in Percentages of Reported Problems and Unmet Continuing Care Needs Between Patients With High and Low ESDP Scores

Subscale[a]	ESDP <10	ESDP ≥10	*p*
PADQ-E information needs	36.3 ± 30.9 26.9 (7.7–61.5)	30.7 ± 31.7 23.1 (0–61.5)	.12
Personal care problems	6.8 ± 17.8 0 (0–0)	20.6 ± 24.9 20 (0–40)	<.001
Personal care unmet needs	1.3 ± 6.8 0 (0–0)	1.9 ± 10.2 0 (0–0)	.66
Household activities problems	27.6 ± 35.6 0 (0–57.1)	52.6 ± 40.4 57.1 (7.1–100)	<.001
Household activities unmet needs	4.1 ± 16.1 0 (0–0)	3.0 ± 13.3 0 (0–0)	.65
Mobility problems	15.7 ± 23.8 0 (0–40)	34.0 ± 31.8 20 (0–60)	<.001
Mobility unmet needs	2.4 ± 9.8 0 (0–0)	1.4 ± 6.2 0 (0–0)	.79
Equipment problems (*n* = 77)[b]	7 (33.3)	7 (12.5)	.048
Problems following instructions (*n* = 142)[c]	5 (7.0)	9 (12.7)	.26
Physical concerns	38.3 ± 20.5 40 (20–50)	43.8 ± 17.9 50 (30–50)	.07
Physical concerns unmet needs	5.1 ± 13.1 0 (0–0)	3.2 ± 8.2 0 (0–0)	.96
Psychological concerns	17.1 ± 26.1 0 (0–28.6)	22.8 ± 27.3 14.3 (0–42.9)	.14
Psychological concerns unmet needs	4.0 ± 15.7 0 (0–0)	2.4 ± 14.4 0 (0–0)	.18
Total score	26.3 ± 15.6 25.3 (14.3–35.4)	34.1 ± 18.9 32.7 (20.6–46.9)	.02
Total unmet needs score	12.1 ± 11.8 10.4 (2.1–19.2)	10.0 ± 10.6 6.2 (0–18.8)	.12

Note. ESDP = Early Screen for Discharge Planning; PADQ-E = Problems After Discharge Questionnaire–English Version.
[a]Data are presented as mean percentage ± *SD*, median (interquartile range), or No. (%).
[b]Summarized for the subset of patients using aids or equipment.
[c]Summarized for the subset of patients following instructions or directions.

TABLE 3
Differences in EQ-5D Scores (Quality of Life) Between Patients With High and Low ESDP Scores

Domain[a]	ESDP <10	ESDP ≥10	*p*
Mobility (*n* = 147)			<.001
No problems	61 (80.3)	33 (46.5)	
Some problems	15 (19.7)	38 (53.5)	
Severe problems	0 (0)	0 (0)	
Self-care (*n* = 148)			.006
No problems	71 (93.4)	56 (77.8)	
Some problems	5 (6.6)	16 (22.2)	
Severe problems	0 (0)	0 (0)	
Usual activities (*n* = 148)			.006
No problems	45 (59.2)	29 (40.3)	
Some problems	29 (38.2)	33 (45.8)	
Severe problems	2 (2.6)	10 (13.9)	
Pain or discomfort (*n* = 148)			<.001
No problems	42 (55.3)	21 (29.2)	
Some problems	33 (43.4)	47 (65.3)	
Severe problems	1 (1.3)	4 (5.6)	
Anxiety or depression (*n* = 148)			.03
No problems	64 (84.2)	49 (68.1)	
Some problems	10 (13.2)	23 (31.9)	
Severe problems	2 (2.6)	0 (0.0)	
Health index raw score	0.9 ± 0.14 0.84 (0.82–1.00)	0.8 ± 0.18 0.80 (0.69–0.83)	<.001
Summary health index	77.2 ± 16.6 80 (70–90)	70.6 ± 20.6 75 (60–89)	.05

Note. EQ-5D = EuroQoL-5Dimensions; ESDP = Early Screen for Discharge Planning.
[a]Data are presented as mean percentage ± *SD*, median (interquartile range), or No. (%). Percentages may not equal 100 because of rounding.

Discussion

The ESDP performed as expected. The hypothesis for Aim 1 was partially supported in that we observed a significantly higher percentage of overall reported problems on the PADQ-E after discharge by patients with high ESDP scores. High ESDP-scoring patients had significantly more reported problems after discharge on three of the five subscales of the PADQ-E. Although the average percentage of unmet needs after discharge of high ESDP-scoring patients was higher than that of low ESDP-scoring patients, the difference was not statistically significant. These findings are consistent with results of the ESDP when used in an academic medical center (Holland et al., 2013).

Patients with high ESDP scores reported significantly lower quality of life after discharge, supporting the hypothesis for Aim 2. Comparisons of self-reported quality of life between patients with high and low ESDP scores have not previously been reported; this finding represents new knowledge regarding the differences between patients with high and low ESDP scores.

Finally, the hypothesis for Aim 3 was that patients with high ESDP scores will have longer lengths of stay and more referrals to post-acute care services than patients with low ESDP scores.

TABLE 4
Differences in Length of Stay and Use of Formal Post-Acute Care Services Between Patients With High and Low ESDP Scores (n = 215)

Characteristic[a]	ESDP <10	ESDP ≥10	*p*
Length of stay, days	3.7 ± 1.8	5.0 ± 6.1	.04
	3 (2–5)	3 (3–5)	
Post-acute care services used			.006
Yes	15 (14.4)	34 (30.6)	
No	89 (85.6)	77 (69.4)	

Note. ESDP = Early Screen for Discharge Planning.
[a]Data are presented as mean percentage ± *SD*, median (interquartile range), or No. (%).

In this study, high ESDP-scoring patients had longer lengths of stay and greater use of post-acute care services at statistically and clinically significant levels. Differences in lengths of stay and use of post-acute care services are consistent with patients hospitalized in academic medical centers (Cook et al., 2013; Holland & Bowles, 2012).

The overall average age of the current sample was higher than that of the sample from a prior study conducted in an academic medical center (Holland et al., 2013). This may have contributed to a greater percentage of participants with an ESDP score of 10 or greater than samples from studies conducted in an academic medical center (Cook et al., 2013; Holland et al., 2013).

Prior work in populations of adults hospitalized in academic medical centers shows that when hospital DP personnel are engaged early in the patients' hospital stay, the timely organization, engagement, and coordination of services needed to improve continuity of care, patient safety, and resource use are enhanced, length of stay is decreased, and patients report fewer unmet needs after discharge (Bowles et al., 2014; Cook et al., 2013; Holland & Bowles, 2012; Holland & Hemann, 2011; Shepperd et al., 2016; Topaz et al., 2015). On the basis of the current study findings, integrating the ESDP into regional community hospital DP processes potentially can result in many of the same corresponding system and patient benefits.

Evidence gained from this study will contribute to improvement in the quality and consistency of DP decisions, supporting an approach that focuses on identifying patients most in need of specialized DP services.

Results of this study must be interpreted in the context of its limitations. The study was conducted in one setting using one model of DP care. Results may not be applicable to other settings with other DP care models. The race/ethnicity of most study participants was non-Hispanic white. The demographics of the study sample may not reflect community hospital patients in other geographic areas. These limitations restrict broad generalizability of study findings. Nevertheless, the results provide important preliminary findings for subsequent studies. Further study is needed to evaluate the ESDP in community hospital settings in a range of geographic areas with more diverse patient populations.

The central hypothesis of this study was that the ESDP differentiates between patients in regional community hospitals who would and would not benefit from early intervention by hospital DP personnel, as measured by problems and unmet continuing care needs in the first few weeks after discharge, quality of life, length of stay, and referrals to post-acute care services. The results of this study support this hypothesis and provide evidence to support the integration of the ESDP into regional community hospital DP processes.

Evidence gained from this study will contribute to improvement in the quality and consistency of DP decisions, supporting an approach that focuses on identifying patients most in need of specialized DP services. This focused DP approach can increase the time available to DP personnel to complete a comprehensive assessment and implement a discharge plan for patients most likely to have substantial post-acute care needs. Moreover, this study confirmed that the ESDP, a freely available open-source tool, is a decision support tool that can be successfully used in regional community hospitals, where most patients receive care.

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