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Understanding Posttreatment Patient-Provider Communication and Follow-up Care Among Self-identified Rural Cancer Survivors in Illinois

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Abstract

Purpose: As disparities in rural-urban cancer survivorship rates continue to widen, optimizing patient-provider communication regarding timely follow-up care is a potential mechanism to improving survivorship-related outcomes. The current study examines sociodemographic and health predictors of posttreatment patient-provider communication and follow-up care and associations between written communication and timely follow-up care for cancer survivors who identify as rural.

Methods: Data were analyzed from posttreatment cancer survivor respondents of the Illinois Rural Cancer Assessment Study. The current study tested associations between sociodemographic variables and health factors on the quality of patient-provider communication and timely posttreatment follow-up care, defined as visits 3 months posttreatment, and associations between the receipt of written patient-provider communication on timely posttreatment follow-up care.

Results: Among 90 self-identified rural cancer survivors, respondents with annual incomes < \$50,000 and High School diploma were more likely to report a high quality of posttreatment patient-provider communication. Posttreatment written communication was reported by 62% of the respondents and 52% reported timely follow-up visits during the first 3 years of posttreatment care. Patients who reported receiving written patient-provider communication were more likely to have timely posttreatment follow-up care after completing active treatment than patients who had not received written patient-provider communication.

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Conclusions: Our findings suggest that written patient-provider communication improved timely follow-up care for self-identified rural cancer survivors. This research supports policy and practice that recommends the receipt of a written survivorship care plans. Implementation of written survivorship care recommendations has the potential to improve survivorship care for rural cancer survivors.

Keywords

cancer survivors; disease management; health communication; rural health; survivorship

The National Cancer Institute (NCI) has estimated that by 2029, the proportion of cancer survivors in the United States will increase 29%, resulting in 21.7 million cancer survivors.¹ Partially due to the emergence of new cancer treatment options, cancer patients are more likely to survive longer beyond treatment.² In addition to advancements in cancer treatments, effective patient-provider communication is a major facilitator for optimizing survivorship outcomes.³⁻⁵ Communication including, but not limited to, a treatment summary, information on the possible late-term effects of treatment, recommended follow-up screenings to monitor recurrent cancers, and a communication plan between health care providers show promise of improving a patient's understanding of their survivorship care and the potential to improve patient-reported survivorship outcomes.^{4,5} Consequentially, a poor understanding of the utility of posttreatment survivorship care can be a barrier to adequate survivorship care, as patients may delay the initiation of or reduce adherence to follow-up care screening for recurrent cancers, lack knowledge of the long-term effects of treatment, and have unaddressed psychosocial (ie, emotional and social) supportive care needs.⁶⁻⁹ Across health care systems and cancer types, posttreatment patient-provider communication is not standardized, and such heterogeneity in communication can increase survivorship risks associated with poor management of posttreatment care.⁸⁻¹² Cancer survivors who receive their care at settings that adhere to the Commission on Cancer (CoC) guidelines are required to receive a survivorship care plan.¹³ Yet, many cancer survivors, such as those treated in non-CoC centers, face inequities in communication of survivorship care plans.¹⁴ This heterogeneity in care can contribute to disparities in long-term survivorship outcomes.

Addressing posttreatment survivorship care, including what are effective modalities, is an emerging priority for underserved communities, including rural cancer survivors. Rural cancer survivors have poorer cancer-specific survival rates than their urban counterparts.^{15,16} These survival rates are influenced, in part, by challenges pertaining to the geographic isolation of rural communities, additional cost burdens of traveling long distances to see specialty providers, and the need to access resources in urban areas.^{17,18} Added to the challenges associated with remote living, patients from or near rural areas are at a greater risk of poorly understanding the utility of survivorship care planning. Cancer survivors and caregivers of cancer patients report a moderate to low understanding of the posttreatment survivorship care recommendations from their health care providers.^{9,19} However, patient-provider communication about the survivor's posttreatment care needs can improve the quality of the posttreatment patient-provider communication and survivorship outcomes, such as timely follow-up care.^{7,20}

As it relates to optimizing posttreatment survivorship communication and the subsequent timely follow-up care for rural cancer patients, preliminary research is necessary to identify the quality and content of posttreatment survivorship communication between rural survivors and their providers. First, evidence of sociodemographic predictors of effective patient-provider communication and subsequent associations between effective patient-provider communication on cancer screenings and treatment initiation are known.^{21–23} In addition, sociodemographic associations between high-quality patient-provider communication regarding survivorship and timely follow-up care are unknown. Second, considering that survivorship communication is not standardized, there is a need to characterize and quantify elements of posttreatment survivorship communication of rural cancer patients and the most effective mode to present this information to improve timely follow-up care.

Given the challenges faced by rural cancer survivors to adhere to timely posttreatment follow-up care, optimizing patient-provider communication and understanding the best mode of delivery for patient-provider communication are critical to improving rural survivorship care. This information has the potential for reducing cancer survivorship disparities experienced by rural cancer survivors. The current study contributes to the existing literature by examining the following among cancer survivors that identify as rural dwellers: 1) sociodemographic and health predictors of posttreatment patient-provider communication and timely follow-up care, and 2) different components of patient-provider communication (quality, mode of delivery) in relation to timely follow-up care.

Methods

Parent Study

The Illinois Rural Cancer Assessment (IRCA) study is a statewide cross-sectional assessment examining mental and physical health status and functioning among rural cancer survivors and caregivers (N=227). This study was approved by the University of Illinois at Chicago Institutional Review Board and University of Illinois Cancer Center Protocol Review Committee.

Recruitment Procedures

Research staff at the University of Illinois in Chicago coordinated all recruitment efforts conducted in rural counties across Illinois. To note, most research staff did not receive monetary compensation for their time. Recruitment occurred in multiple waves. First, the study team attempted but was unable to partner with state cancer registries to recruit participants. Given this, Wave 1 (January 2017 – February 2018) recruitment efforts included community outreach methods from study staff in Chicago with 152 rural clinics, 120 health departments/government-funded health agencies, 16 academic institutions, and 79 community organizations (eg, churches). Willing partners received paper and electronic flyers, which could be distributed through listservs, social media, and websites. We also specifically tailored flyers (eg, pictures of male and racial/ethnic minority survivors) and distributed them to organizations with a substantial number of men and racial/ethnic minorities (eg, VA hospitals, African American churches). Recruitment partners who

volunteered and distributed information did so without monetary compensation, due to restricted funds from this intramurally funded study. Recruitment partners were, however, able to promote their organization through the study team's monthly newsletters and were able to solicit study team members for talks on rural cancer disparities for their constituents, as was of interest. In Wave 2, we expanded our recruitment efforts to respond to slower than expected recruitment rates from Wave 1. Wave 2 (March 2018 – September 2018) recruitment used commercial lists of 1,558 landline and 2,056 cellular telephone numbers within the 63 rural counties (RUCC=4-9) in Illinois, as well as 1 adjacent metropolitan county with fewer than 250,000 residents (RUCC=3). Research personnel started by calling phone numbers from the counties with the highest proportion of African American residents, and then they moved on to counties with the lowest proportion.²⁴ Purchase of commercial lists was considered the optimal strategy for attempting a wide reach of this small, widely dispersed population across multiple rural communities with minimal funds. This strategy may, however, have been too broad, as we were unable to specify telephone lists to cancer survivors. In terms of participant compensation, participants could receive \$15-\$25. Compensation was increased by \$10 during Wave 2, when we modified the consent process to include an opportunity wherein participants could be re-contacted in future survivorship studies.

Inclusion Criteria—Eligible individuals were self-reported as 18 years or older, a cancer survivor or a caregiver of a cancer patient, and self-identified as a resident of a rural Illinois county.

Exclusion Criteria—This study's focus was on cancer survivors' posttreatment communication. We did not recruit study dyads or collect data on survivors' posttreatment experiences from caregivers. We recruited caregivers for the larger study to understand their own unique experiences as caregivers and not to provide patient data for this study (ie, patients' timely follow-up care). Therefore, we excluded caregivers (n=88) from the current study. Also, respondents in active treatment (n=45), those that did not require treatment (n=3), and one individual who did not complete the posttreatment follow-up questions were excluded (Figure 1). Following the National Coalition for Cancer Survivorship²⁵ definition, cancer survivors were cancer patients in the posttreatment period to end-of-life.

Survey Procedures

After screening and providing informed consent, respondents had the option to complete the survey either online, by telephone, or by self-administration with an additional option to return the survey by mail or in-person at a cancer-related event. The duration of the survey was approximately 75 minutes. Attrition or partial survey respondents appeared relatively low, with 99% of survivors answering the last 5 questions.

Measures

Patient-provider communication quality was measured with a 4-item survey instrument from the Medical Expenditure Panel Survey's (MEPS) Experience with Cancer Care section to measure patient-provider communication quality.²⁶ Patient-provider communication quality items included discussion items on 1) *regular follow-up care and monitoring*, 2) *late or long-*

term side effects of cancer treatment, 3) emotional or social needs, and 4) lifestyle or health recommendations (Table 1). The type of provider was not specified for each item. Traditional scoring for this survey includes a 3-category ordinal variable, including High (3 “discussed in detail” responses and 0 “did not discuss” responses); Medium (other combinations of “discussed in detail,” “briefly discussed,” and “did not discuss” responses outside of combinations specified for High and Low Quality); and Low (1 “did not discuss” and 2 “discussed in detail” responses). Table 1 reports the frequency distributions of individual items. Based on preliminary analyses, the composite variable was dichotomized to be High or Not High (Low/Medium). *Timely Posttreatment Follow-Up* was defined as follow-up care by 3 months of posttreatment. Clinical implications, such as an increased likelihood of cancer recurrence and decreased survival rates resulting from delays in follow-up care are reported as early as 3 months posttreatment. The authors chose a threshold of 3 months for timely follow-up treatment because of its clinical significance.^{27–29} Timely posttreatment follow-up was measured with a single item from the MEPS Cancer Survivor Supplement.²⁶ Survivors were asked about how often they visited the doctor for follow-up appointments during the first 3 years after completion of treatment. A dichotomous variable indicated if the follow-up was greater than 3-months, or less than or equal to 3 months.

Covariates included demographic, socioeconomic, rurality, cancer-related, and other health factors using items from the Behavioral Risk Factor Surveillance System,³⁰ the MEPS Cancer Survivor Supplement,²⁶ Memorial Symptom Assessment Scale (MSAS),³¹ and the Self-Administered Comorbidity Questionnaire.³² Demographic factors included age, gender (male/female), race/ethnicity (non-Hispanic white/other), and marital status (married/non-married). Socioeconomic factors included age (continuous), education (< Bachelor’s/ ≥ Bachelor’s), annual household income (< \$50,000/ ≥ \$50,000), and private insurance (yes/no). Rurality was defined by RUCC (1-9). Cancer-related factors included cancer site (breast, gynecological, digestive, skin, lymphoma, other) and time since last treatment (< 5 years/ ≥ 5 years). For treatment-related symptoms, we calculated the Global Distress Index score (possible range = 0-4), which was the average of 24 symptom scores that incorporated presence (yes/no), frequency (rarely, occasionally, frequently, almost constantly), and associated severity/distress (not at all, a little bit, somewhat, quite a bit, very much) during the past week. Other health factors included current tobacco use (yes/no) and the number of lifetime comorbidities.

Statistical Analysis

All analyses were conducted in SPSS 25. First, missingness and descriptive statistics were assessed for the study sample. Given the relatively low amount of missingness, single imputation was conducted. Second, a bivariate analysis using chi-square tests (gender, race, marital status, private insurance, cancer sites, current tobacco use), independent t-tests (age, treatment-related symptoms, number of lifetime comorbidities), and Mann Whitney U tests (income, education, rurality) characterized relationships between demographic, socioeconomic, rurality, cancer-related, and other health factors with posttreatment patient-provider communication quality, written patient-provider communication, and timely follow-up care. Third, we conducted multivariable logistic regression models to examine the

relationship between posttreatment patient-provider communication quality, written patient-provider communication, and timely follow-up care in crude models and Type III models including different domains of covariates (demographic factors, socioeconomic factors, degree of rurality, cancer-related, other health-related factors). For these models, we report likelihood ratios to compare model fit between crude models and models adjusting for different types of covariates. Due to sample size, we did not conduct a full model including all covariates. Sensitivity analyses were also conducted, wherein crude and adjusted models were replicated with non-imputed data only; with imputed data from Wave 1 respondents only, to address for effects of recruitment strategies; and with imputed data among respondents in non-metropolitan counties (RUCC 4-9). We do not report findings when including Wave 2 respondents only or respondents from metropolitan counties (RUCC 1-3) due to small subsample sizes.

Results

Sociodemographic and Health Predictors of Posttreatment Patient-Provider Communication and Timely Follow-up Care

The current study elucidated patient-provider communication data from 90 cancer survivors. Table 2 shows associations between demographic, socioeconomic, rurality, cancer-related, and other health-related factors and the quality of posttreatment patient-provider communication, written posttreatment patient-provider communication, and timely follow-up care. There were relatively low levels of missing data (1%), except for income and cancer sites, wherein 7% of the sample did not provide the data. Most respondents were 64 years or younger (71%). Most of the overall sample was female (82%), non-Hispanic white (93%), married (73%), had private insurance (61%), and lived in a non-metropolitan county (59%). Half of the overall sample had a Bachelor's degree or greater and about half of the population (51%) had a household income of < \$50,000. With regard to cancer-related and other health factors, breast cancer was the most reported primary cancer site (34%). The average score for the Global Distress Index was 0.76 (SD: 0.82). Most respondents had their last treatment more than 5 years after completion of the survey (52%). Approximately 11% of the sample currently used tobacco. The average number of lifetime comorbidities was 5.77 (SD: 3.57).

As shown in Table 2, 63% of the respondents reported not having high-quality posttreatment patient-provider communication, 62% reported not receiving any posttreatment written communication, and 52% reported visiting the doctor > 3 months for a follow-up visit during the first 3 years of posttreatment care. More respondents with fewer years of education and lower incomes reported high-quality posttreatment patient-provider communication relative to respondents with more education and higher incomes (64% and 59%, respectively). Of the respondents receiving treatment within the last 5 years of completing the survey, 30% obtained timely follow-up care, whereas 70% of the respondents receiving treatment \geq 5 years after completing the survey received timely follow-up care ($P = .001$). Respondents reporting greater treatment-related symptoms were more likely to have received timely follow-up care ($P < .001$).

Relationships Between Posttreatment Patient-Provider Communication and Timely Follow-up Care

Across crude, adjusted, and sensitivity models (Table 3), respondents receiving written communication had greater odds of reporting timely follow-up care than those who did not receive written communication. Quality of patient-provider communication was largely not associated with timely follow-up care. Models adjusting for cancer-related factors appeared to exhibit a better fit than crude models most consistently, when analyzing imputed data, analyzing non-imputed data, and focusing on subsets of our sample. When focusing on self-identified respondents in rural counties ($n = 53$), similar patterns emerged regarding written communication and timely follow-up care. There were additionally inconsistent relationships regarding quality of patient-provider communication and timely follow-up; however, these patterns should be interpreted cautiously due to the sparse subsample size.

Discussion

There are multiple factors that impact cancer survivorship among rural cancer survivors. Our study is the first to investigate the quality and method of delivery of posttreatment patient-provider communication for self-identified rural cancer survivors. Insights from this rural cancer survivor sample offer an important and underrepresented perspective on posttreatment survivorship care that is critical to timely follow-up care and improving survivorship outcomes. Our study sample and design are also unique in that the aim is to describe multiple posttreatment experiences from a statewide sample of residents that self-identify as rural dwellers representing different cancer types.

Findings from our study underscore the need for communication tools that guide providers through an additional assessment of necessary psychosocial and health behavior supportive care needs of patients completing treatment. Survivorship care needs associated with side effects, self-care, and emotional coping are the highest reported unmet care needs.³³ Further, survivorship care needs of rural survivors can differ from the needs of their urban counterparts. Rural cancer survivors experience a greater need for physical and daily living care needs that may be associated with limited access to resources.³⁴ Adequate review and delivery of care needs can improve a survivor's quality of life,^{3, 35} satisfaction of care,³ follow-up care initiation and adherence, and other related survivorship outcomes.

Notably, our study highlighted sociodemographic differences in receipt of high-quality patient-provider communication. The findings that survivors with lower levels of education and income were more likely to report a high quality of patient-provider communication were unexpected findings of this study. Higher cancer disease and mortality burdens are associated with low income, low levels of education, and reduced access to quality health care services.^{36–39} Further, patients living in low socioeconomic conditions more often report poorer communication with their providers.^{40,41} In a sample of childhood cancer survivors, survivors with an annual household income less than \$50,000 were less likely to report any communication focused on survivorship or follow-up screening recommendations.⁴² One explanation for our findings may have been the lack of convenience-based sampling and the oversampling of female survivors, who when compared to men, are more likely to report poor patient-provider communication.⁴³ Future

observational research should incorporate participants' potential exposure to health equity interventions and programs.

Additionally, respondents who reported receiving written posttreatment communication were 4-5 times more likely than those who received only oral communication to have timely follow-up care. This finding supports the U.S. National Coalition for Cancer Survivorship's and the CoC's recommendation that survivors and caregivers should receive a written care plan at diagnosis and throughout survivorship.²⁵ Consistent with this study's findings, previous studies have reported that written posttreatment survivorship care contributed to the understanding of—and adherence to—necessary follow-up care for cancer survivors.⁴⁴ However, Kadan-Lottick and associates⁴⁵ reported that cancer survivors receiving a written survival care plan and verbal communication from a primary care provider were significantly less likely to adhere to recommended follow-up care than those receiving only verbal communication from a provider. A potential explanation for the mixed results on the value of written communication to follow-up care adherence is that providers and survivors report important barriers to fully implementing a written care plan.^{46,47} The consequences of inconsistent implementation of written posttreatment patient-provider communication can potentially increase measurement errors and limits the interpretation of the findings. Emerging investigations should continue to identify the most functional elements of care plans for providers to initiate posttreatment communication to minimize patient information burden and provider administrative duties.⁴⁷

There are many challenges associated with recruiting a substantial, diverse, representative sample of exclusively rural respondents. Our study offers an important set of “lessons learned” for obtaining in-depth data from rural cancer survivors, especially regarding data not routinely collected in public health surveillance systems. First, we considered sample size, which was limited in part by distance between the primary study institution and identifying eligible respondents from remote locations as well as available funding. We were unable to access infrastructure for population-based sampling (eg, registry-academic partnerships). We attempted to approach both community and clinical partners for recruitment assistance in Wave 1, using best practices and multiple methods. Yet, recruitment was challenging. It is important to note that remote engagement of largely non-compensated research staff and non-compensated local recruitment partners likely limited our reach to partners that had access to available recruitment resources. During Wave 2, we attempted to use commercial phone lists with a focus on more diverse rural counties. Yet, this strategy did not yield a greater recruitment rate, likely in part due to its broad reach and our inability to obtain an exclusive list of cancer survivors and caregivers. Second, we considered the sampling frame's ethnic diversity. We had a small, largely white and female sample despite multi-pronged methods and intentional attempts to recruit a diverse sample (eg, tailored flyers throughout Waves 1 and 2, with a Wave 2 focus on more ethnically diverse counties). As well, our sampling frame was not very diverse in general. According to available race/ethnicity data by Illinois county from the 2016-2017 US Census Data, counties represented in this study are 91% Caucasian, 7.5% African American, 1.4% Asian or Pacific Islander, 0.1% Other, and 2.4% Hispanic/Latino.⁴⁸ Third, we considered that the study team was affiliated with and working from Chicago, Illinois. Consequently, our combined recruitment efforts of engaging non-compensated community and clinical partners

remotely, use of predominantly online data collection methods, the use of commercial telephone lists, reliance on materials solely printed in English, and recruitment in predominantly non-Latino white rural settings may not have been optimal for obtaining a diverse sample. Fourth, we considered the representativeness of this sample. Given that 81 respondents of this sample were recruited in Wave 1, our associations likely reflect the experiences of survivors recruited from Wave 1 strategies. This high survey completion rate (99%) likely reflects that this sample may not be representative of all cancer survivors, but represents the experiences of particularly motivated, well-resourced, and higher health literacy rural cancer survivors. Although the generalizability of this study is limited by the small sample size and small representation of individuals from racially/ethnically diverse subpopulations, the implications of these findings are still important to the broader topic of survivorship care planning and its relationship with healthy survivorship outcomes. Further, our study suggests the importance of prioritized funding for rural cancer research and the benefits of recent commitments the National Cancer Institute has made to address this need.^{49,50}

There are several other limitations in this study. Whereas respondents provided retrospective accounts of their patient-provider communication, these findings are subject to recall bias. Consequently, the main study findings focus on the receipt of *any* written communication, including an SCP or related posttreatment materials; therefore, we used trained interviewers and a broad research question to improve respondent understanding. Yet, it is important for future research to focus on the type of written communication and type of provider who delivers these services (eg, primary care provider, oncologist, or nurse). Additionally, guidelines for recommended follow-up care differ by cancer types. The quality of evidence supporting timely follow-up for cancer recurrence is low, although evidence suggests that longer wait times to follow-up increase the risk of poorer survivorship outcomes.⁵¹ Due to this study's use of a conservative 3-month threshold for timely follow-up care, conclusions may have underreported the frequency of timely follow-up care. Our inferential models were not likely powered to assess the contributing roles of all covariates, especially with regard to participants living in counties with RUCC of 4+. There is a possibility of overestimation, or Type 1 error, for some of our models and we were unable to conduct a full model due to statistical power issues. Relatedly, we were unable to incorporate other important potential confounders, including disease severity (eg, subtype, tumor aggressiveness), type of treatment, and distance from the treatment facility, which were not collected for the parent study. Regarding missingness, although 7% of the surveys were missing annual income data, we observed no difference in the effect of income on the primary association in both the imputed and non-imputed models. Last, information from our findings includes data from rural residents and residents of metropolitan counties (37%) with populations less than 250,000. In spite of the categorization of metropolitan and non-metropolitan counties, all respondents self-identified as rural residents. The nominal designation of rural and urban areas continues to be a point of inquiry through cancer disparities research, and findings from this study add to the prevailing commentary and research to identify the most accurate representation of rural and urban areas as both continuous and discrete groups.⁴⁹ Finally, the parent study recruited the perspectives of caregivers. However, in this study, dyads were not recruited and caregivers were not asked about patients' posttreatment follow-up care. Thus,

their valuable perspectives could not be incorporated into this study's analyses. This is an important point for future research, as caregivers' perspectives and roles may shed light into our study's results regarding the value of survivors receiving written care plans.

Conclusion

In conclusion, this study provides novel information about the sociodemographic and health care predictors of high-quality posttreatment patient-provider communication and timely follow-up care, and the association between high-quality patient-provider communication and timely follow-up care for rural cancer survivors. The evidence supporting the relationship between timely survivorship follow-up care and survivorship outcomes is limited, and it is imperative to understand posttreatment patient-provider communication for medically underrepresented populations such as rural cancer survivors. This study also provides clear rationale for the need for additional research that can examine effective health communication between patients and providers to ensure uptake of evidence-based recommendations for cancer survivors. In order to standardized communication regarding survivorship care, there is great promise for innovative health communication tools to improve patient-provider communication and explore survivorship communication needs of rural cancer survivors. As cancer survivors are living longer posttreatment and investigations on survivorship care emerge, the current study uniquely contributes to the growing body of evidence that supports the addition of written communication in posttreatment patient-provider communication to improve timely follow-up care.

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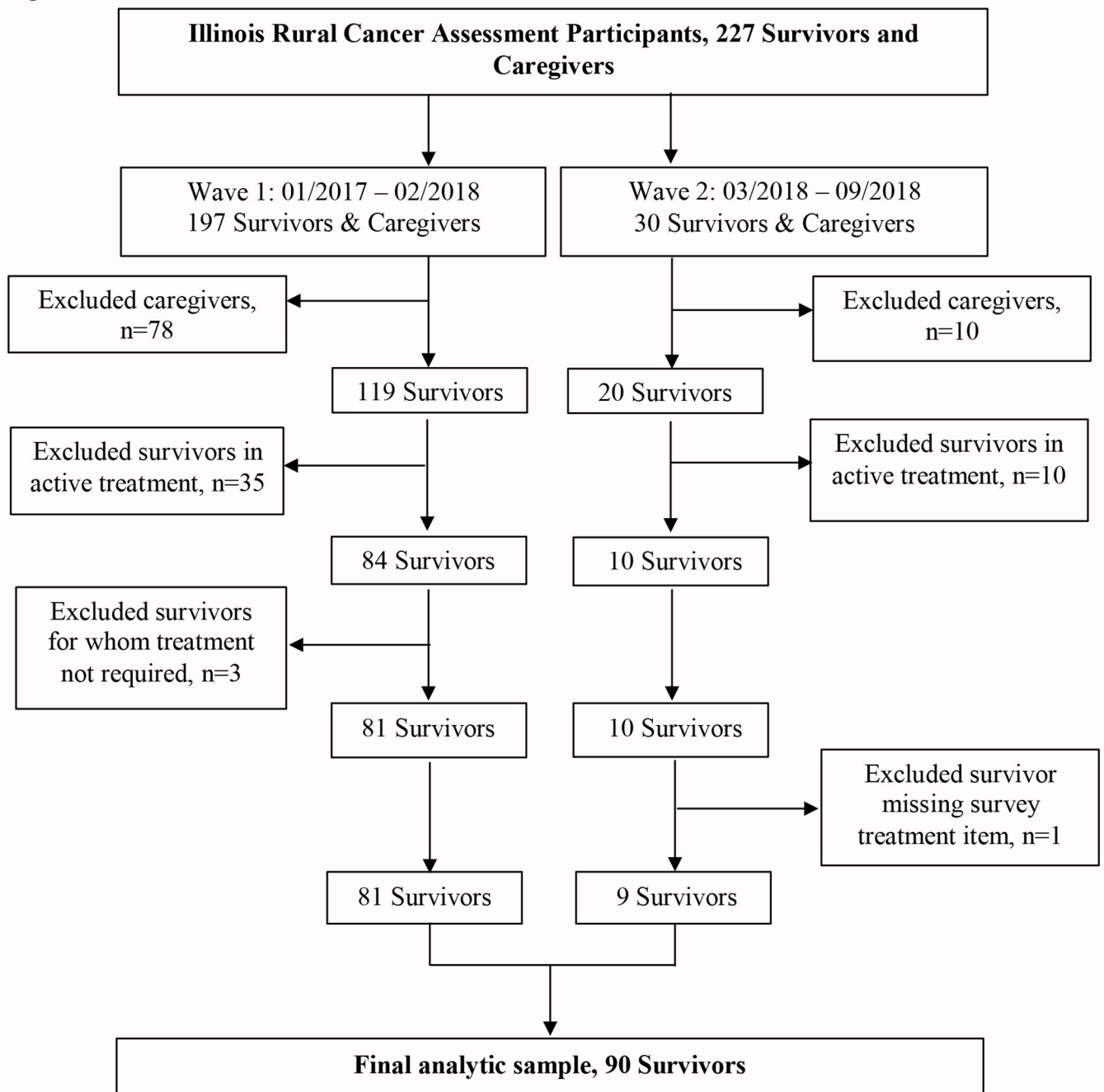


Figure 1:
Illinois Rural Cancer Assessment Enrollment Flow Chart

Table 1.

Frequency Distribution of Individual Items in Patient-Provider Communication Instruments (n=90)

Patient-Provider Communication^a Quality	n	%
Discussed the need for regular follow-up care and monitoring even after completing your treatment?		
In detail	72	80%
Briefly	14	16%
Not at all	4	4%
Discussed late or long-term side effects of cancer treatment you may experience over time?		
In detail	38	42%
Briefly	31	34%
Not at all	21	23%
Discussed your emotional or social needs related to your cancer, its treatment, or the lasting effects of that treatment?		
In detail	29	32%
Briefly	28	31%
Not at all	33	37%
Discussed your lifestyle or health recommendations such as diet, exercise, or quitting smoking.		
In detail	42	47%
Briefly	37	41%
Not at all	11	12%
Written Patient-Provider Communication^a		
Written summary of all cancer treatments		
Yes	38	42%
No	52	58%
Written summary of recommended follow-up care		
Yes	62	69%
No	28	31%

^aType of provider was not specified.

Table 2. Study Sample Characteristics by Posttreatment Communication and Follow-up Care Utilization (N = 90)

DEMOGRAPHIC FACTORS	Missing (%)	Quality of Patient-Provider Communication						Posttreatment Follow-up										
		Overall (n=90)	High (n=33)	Not High (n=57)	All (n=34)	Not All (n=56)	P value	3 Months (n=47)	<3 months (n=43)	P value	n	%	n	%	P value	n	%	
Age^d	0						.70							.29			.29	
53 years old		34	38	14	42	20	35	10	29	24	43	21	45	13	30			
54-64 years old		30	33	11	33	19	33	14	41	16	29	14	30	16	37			
65-83 years old		26	29	8	24	18	32	10	29	16	29	12	26	14	33			
Sex	0						.22										.72	
Male		16	18	8	24	8	14	9	27	7	13	9	19	7	16			
Female		74	82	25	76	49	86	25	74	49	88	38	81	36	84			
Race	0						.67										.42	
non-Latino White		84	93	30	91	54	95	24	71	42	75	45	96	39	91			
Other		6	7	3	9	3	5	10	29	14	25	2	4	4	9			
Marital Status	0						.55										.46	
Married		66	73	23	70	43	75	24	71	42	75	36	77	30	70			
Not married		24	27	10	30	14	25	10	29	14	25	11	23	13	30			
SOCIOECONOMIC FACTORS																		
Education^b	0						.02										.75	.06
<Bachelor's Degree		45	50	21	64	24	42	16	47	29	52	27	57	18	42			
Bachelor's Degree		45	50	12	36	33	58	18	53	27	48	20	43	25	58			
Household income^b	7						.04										.01	.11
<\$50,001		38	42	19	59	19	37	19	59	19	36	23	52	15	37			
\$50,001		46	51	13	41	33	64	13	41	33	67	21	47	25	63			
Private health care insurance	0						.71										.73	.46

DEMOGRAPHIC FACTORS	Quality of Patient-Provider Communication						Written Communication						Posttreatment Follow-up							
	Overall (n=90)	High (n=33)	Not High (n=57)	All (n=34)	Not All (n=56)		All (n=34)	Not All (n=56)		3 Months (n=47)	<3 months (n=43)		All (n=34)	Not All (n=56)		3 Months (n=47)	<3 months (n=43)			
Missing (%)	n	%	n	%	n	%	n	%	n	%	P value	n	%	n	%	n	%	n	%	P value
Yes	55	61	21	64	34	60	14	41	21	38		27	57	28	65					
No	35	39	12	36	23	40	20	59	35	63		20	43	15	35					
RURALITY^b	0					.12				.47					.14					
Metropolitan (RUCC 1-3)	37	41	17	51	20	35	14	41	23	41		19	44	18	38					
Non-metropolitan (RUCC 4-9)	53	59	16	49	37	65	20	59	33	59		24	56	29	61					
CANCER-RELATED FACTORS																				
Cancer sites	7					.94				.91					.18					
Breast cancer	31	34	12	38	19	33	11	32	20	36		17	36	14	33					
Gynecological	8	9	3	9	5	9	3	9	5	9		3	6	5	12					
Digestive	8	9	3	9	5	9	2	6	6	11		3	6	5	12					
Skin	9	10	3	9	6	11	3	9	6	11		2	4	7	17					
Lymphoma	13	15	3	9	10	18	6	17	7	13		9	19	4	10					
Other	20	23	8	25	12	21	9	27	11	20		13	28	7	17					
Range	M	SD	M	SD	M	SD	M	SD	M	SD		M	SD	M	SD					
Treatment-related Symptoms	0	0-3.32	0.76	0.63	0.73	0.87	0.85	0.87	0.70	0.79	.41	1.05	0.88	0.43	0.62	<.001				
Time Since Last Treatment	0					.16				.45					.001					
<5 years	43	48	19	58	24	42	18	53	25	45		13	30	30	64					
5+ years	47	52	14	42	33	58	16	47	31	55		30	70	17	36					
OTHER HEALTH FACTORS																				
Tobacco Use	1					.96				.19					.84					

DEMOGRAPHIC FACTORS	Missing (%)	Quality of Patient-Provider Communication						Written Communication						Posttreatment Follow-up					
		Overall (n=90)		High (n=33)		Not High (n=57)		All (n=34)		Not All (n=56)		3 Months (n=47)		<3 months (n=43)					
		n	%	n	%	n	%	n	%	n	%	n	%	n	%				
Yes		11	12	4	12	7	13	32	94	46	84	6	13	5	12				
No		78	88	29	88	49	88	2	6	9	16	40	87	38	88				
		Range	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD			
Number of lifetime comorbidities		0	0-14	5.77	5	3	6	4	.10	6.32	3.78	5.16	3.27	.13	6.31	3.78	5.16	3.27	.13

^aVariables presented categorically to facilitate interpretability, but analyzed as continuous variables.

^bVariables presented categorically to facilitate interpretability, but analyzed as ordinal variables.

Significant associations ($P < .05$) are in bold. Non-significant associations ($P < .10$) are italicized.

Table 3. Multivariable Logistic Regression Models Examining Posttreatment Communication and Follow-up Care Utilization

Model Fit	Crude Model			Model with Demographic Factors			Model with Socioeconomic Factors			Model with Residential County Rurality			Model with Cancer-related Factors			Model with Other Health-related Factors			
	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	
--	--	--	--	4.32	2	.12	2.92	3	.40	0.66	1	.42	20.51	3	.01	5.52	2	.06	
Individual Predictors																			
	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value	
Quality of patient-provider communication	1.78	0.64, 4.96	.27	1.65	0.57, 4.78	.36	1.51	0.51, 4.45	.46	1.92	0.67, 5.50	.23	2.44	0.74, 8.05	.14	2.25	0.75, 6.72	.15	
Written communication	4.29	1.52, 12.10	.01	5.76	1.88, 17.66	.002	5.25	1.71, 16.13	.004	4.18	1.47, 11.87	.01	4.28	1.31, 13.94	.02	5.04	1.68, 15.12	.004	
DEMOGRAPHIC FACTORS																			
Age				0.97	0.93, 1.00	.08													
Marital Status (REF: Not Married)				1.92	0.65, 5.63	.24													
SOCIOECONOMIC FACTORS																			
Education (REF: <Bachelor's)				0.46	0.17, 1.26	.13													
Income ^a				1.07	0.72, 1.57	.75													
Private insurance (REF: No)				0.69	0.25, 1.95	.49													
RURALITY (REF: RUCC 1-3)				1.48	0.58, 3.78	.42													

Model Fit	Crude Model			Model with Demographic Factors			Model with Socioeconomic Factors			Model with Residential County Rurality			Model with Cancer-related Factors			Model with Other Health-related Factors		
	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value
CANCER-RELATED FACTORS																		
Breast Cancer (REF: No)							0.96	0.32, 2.90	.94									
Treatment-related symptoms ^a							3.28	1.49, 7.23	.003									
Time since last treatment (REF: <5 years)							0.34	0.12, 0.98	.05									
OTHER HEALTH FACTORS																		
Tobacco Use (REF: No)													1.57	0.37, 6.70	.55			
Number of lifetime comorbidities ^a													1.17	1.01, 1.35	.03			
Models with Non-Imputed Data (n=83)																		
Model Fit	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value
	--	--	--	4.89	2	.09	1.76	3	.62	0.53	1	.47	25.99	3	.002	3.72	2	.16
Individual Predictors	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value
Quality of patient-provider communication	2.54	0.48, 13.35	.27	1.87	0.60, 5.79	.28	1.79	0.57, 5.59	.32	2.26	0.73, 6.98	.16	3.03	0.80, 3.03	.11	2.37	0.76, 7.40	.14
Written communication	4.78	1.58, 14.48	.01	6.89	2.04, 23.25	.005	5.51	1.65, 18.37	.005	4.56	1.49, 13.96	.01	6.41	1.62, 25.40	.008	5.55	1.73, 17.80	.004
DEMOGRAPHIC FACTORS																		

Model Fit	Crude Model			Model with Demographic Factors			Model with Socioeconomic Factors			Model with Residential County Rurality			Model with Cancer-related Factors			Model with Other Health-related Factors		
	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value
Age				0.96	0.92, 1.00	.06												
Marital Status (REF: Not Married)				1.93	0.63, 5.93	.25												
SOCIOECONOMIC FACTORS																		
Education (REF: <Bachelor's)				0.54	0.18, 1.62	.27												
Income ^a				1.02	0.65, 1.59	.93												
Private insurance (REF: No)				0.75	0.26, 2.22	.61												
RURALITY (REF: RUCC 1-3)							1.45	0.53, 3.98										.47
CANCER-RELATED FACTORS																		
Breast Cancer (REF: No)				1.64	0.47, 5.70	.44												
Treatment-related symptoms ^a				4.03	1.69, 9.64	.002												
Time since last treatment (REF: <5 years)				0.24	0.07, 0.80	.02												
OTHER HEALTH FACTORS																		
Tobacco Use (REF: No)				1.71	0.40, 7.37	.47												
Number of lifetime comorbidities ^a				1.14	0.98, 1.32	.09												

Crude Model		Model with Demographic Factors			Model with Socioeconomic Factors			Model with Residential County Rurality			Model with Cancer-related Factors			Model with Other Health-related Factors					
Model Fit	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	
Models with Imputed Data among Wave 1 participants only (n = 81)																			
Model Fit	--	--	--	5.20	2	.07	2.19	3	.53	1.52	1	.22	21.35	3	.01	4.53	2	.10	
Individual Predictors	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value	
Quality of patient-provider communication	1.65	0.57, 4.77	.35	1.49	0.49, 4.54	.48	1.48	0.49, 4.51	.49	1.89	0.63, 5.68	.25	2.19	0.62, 7.78	.23	1.99	0.65, 6.09	.23	
Written communication	3.29	1.15, 9.46	.03	4.48	1.43, 14.02	.01	3.99	1.29, 12.38	.02	3.09	1.06, 9.02	.04	3.12	0.92, 10.62	.07	4.04	1.32, 12.36	.01	
DEMOGRAPHIC FACTORS																			
Age				0.96	0.92, 1.00	.06													
Marital Status (REF: Not Married)				2.14	0.72, 6.41	.17													
SOCIOECONOMIC FACTORS																			
Education (REF: <Bachelor's)							0.49	0.17, 1.39	.18										
Income ^a							1.09	0.73, 1.62	.69										
Private insurance (REF: No)							0.72	0.26, 2.06	.54										
RURALITY (REF: RUCC 1-3)							1.83	0.69, 4.84	.22										

Model Fit	Crude Model			Model with Demographic Factors			Model with Socioeconomic Factors			Model with Residential County Rurality			Model with Cancer-related Factors			Model with Other Health-related Factors					
	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value			
CANCER-RELATED FACTORS																					
Breast Cancer (REF: No)															0.72	0.22, 2.32	.58				
Treatment-related symptoms ^a															3.67	1.48, 9.13	.005				
Time since last treatment (REF: <5 years)															0.32	0.10, 0.97	.05				
OTHER HEALTH FACTORS																					
Tobacco Use (REF: No)																		1.86	0.36, 9.63	.46	
Number of lifetime comorbidities ^a																		1.15	0.99, 1.33	.06	
Models with Imputed Data among participants in non-metropolitan counties (RUCC 4-9) only (n=53)																					
Model Fit	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value
	--	--	--	3.15	2	.21	4.46	3	.22	3.87	1	.05	12.52	3	.04	6.24	2	.04			
Individual Predictors	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value	OR	95%CI	P value
Quality of patient-provider communication	3.72	0.80, 17.36	.09	2.39	0.47, 12.18	.29	2.63	0.49, 14.04	.26	5.37	1.01, 28.47	.05	3.46	0.60, 20.13	.17	7.34	1.15, 47.04	.04			
Written communication	7.72	1.79, 33.24	.01	13.8	2.53, 75.69	0	12.6	2.23, 71.52	.004	6.08	1.33, 27.81	.02	11.61	2.20, 61.39	.004	9.73	1.94, 48.89	.006			
DEMOGRAPHIC FACTORS																					
Age				0.95	0.89, 1.01	.12															

Model Fit	Crude Model			Model with Demographic Factors			Model with Socioeconomic Factors			Model with Residential County Rurality			Model with Cancer-related Factors			Model with Other Health-related Factors		
	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value	LR	df	P value
Marital Status (REF: Not Married)	1.78	0.40, 7.98	.45															
SOCIOECONOMIC FACTORS																		
Education (REF: <Bachelor's)				0.26	0.06, 1.24	.09												
Income ^a				1.06	0.61, 1.85	.84												
Private insurance (REF: No)				0.49	0.10, 2.49	.39												
RURALITY (continuous)							1.75	0.98, 3.14	.06									
CANCER-RELATED FACTORS																		
Breast Cancer (REF: No)							1.53	0.30, 7.92	.61									
Treatment-related symptoms ^a							3.34	1.09, 10.28	.04									
Time since last treatment (REF: <5 years)							0.41	0.08, 2.05	.28									
OTHER HEALTH FACTORS																		
Tobacco Use (REF: No)							2.28	0.29, 18.07	.43									
Number of lifetime comorbidities ^a							1.28	1.02, 1.60	.03									

^a Analyzed as a continuous variable.

Significant associations ($P < .05$) are in bold. Non-significant associations ($P < .10$) are italicized.