Cancer Caregiver: Perceived Benefits of Technology

Maria I. Lapid, MD,¹ Pamela J. Atherton, MS,²
Matthew M. Clark, PhD, LP,¹ Simon Kung, MD,¹
Jeff A. Sloan, PhD,² and Teresa A. Rummans, MD¹

Departments of ¹Psychiatry and Psychology and ²Health Sciences Research, Mayo Clinic, Rochester, Minnesota.

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Abstract

Background: The burden associated with caregiving has been well documented. Caregivers have multiple responsibilities, and technology may be accessible as a potential burden-alleviating resource. **Materials and Methods:** We surveyed cancer caregivers regarding current technology use and willingness to use technology for easing burden or distress. Because age has been associated with technology use, responses were compared between geriatric (≥ 65 years old) and nongeriatric (18–64 years old) caregivers. **Results:** We had 112 respondents. Based on nonmissing responses, 66% ($n=71$) were women, 95% ($n=106$) were white, and 84% ($n=91$) had post-high school education. Almost all caregivers reported having Internet (105 [94%]) and e-mail (102 [91%]) access. Nongeriatric caregivers indicated more willingness to access Internet-based tools that help caregivers (54 [93%] versus 41 [76%]; $p=0.04$) and were more frequent users of social media (37 [64%] versus 16 [30%]; $p=0.01$), smartphones (33 [57%] versus 16 [30%]; $p=0.01$), and other mobile wireless devices (42 [72%] versus 19 [35%]; $p<0.001$) than geriatric caregivers. They also more frequently expected technologies to improve their own quality of life ($p=0.009$), increase their feelings of being effective as a caregiver ($p=0.02$), and save time ($p=0.003$). Regardless of age, a majority of caregivers (67 [62%]) endorsed the potential benefit of caregiving technologies in preventing burnout. **Conclusions:** Most caregivers have high access to and use of technology. Geriatric and nongeriatric caregivers were receptive to technology-based tools to help with their caregiving roles. Although nongeriatric caregivers expected to derive more benefit from such tools, both groups believed that caregiving technologies could reduce burden.

Key words: family, informal caregiver, intervention, oncology, psychosocial technology

Introduction

Advances in information technology and medical informatics have created novel opportunities to deliver new healthcare models. One promising area is the use of technology to reduce caregiver burden. In the United States, 12 million people currently have a diagnosis of cancer,¹ with new diagnoses occurring at a median age of 66 years.² Cancer is the second leading cause of death in persons 65 years of age and older.³

With the ever-increasing numbers of U.S. cancer patients and cancer survivors, the burden of caring for cancer patients is often placed on informal caregivers, defined as unpaid persons who provide physical, practical, or emotional care, or a combination, and support to cancer patients in the home or other healthcare setting.⁴ A wide range exists in the estimates of the number of informal caregivers in the United States, depending on the definitions and criteria used. In general, approximately one-third of the U.S. adult population (about 65.7 million people) serve a role of informal caregiver to someone who is ill, disabled, or aged.^{5,6} The value of services provided by caregivers is substantial, estimated in 2009 to be \$450 billion per year—an amount that is expected to increase with the rapid aging of the U.S. population.⁷ Informal caregiving has a profound impact on the caregiver's economic, physical, psychological, and social well-being.⁷

In the current healthcare environment, demand is increasing on caregivers to take care of patients at home. Therefore, it is imperative to develop effective strategies to support the cancer caregiver. Technologies can improve healthcare through delivering quality care that is cost- and time-effective.⁸ Cancer caregivers use the Internet frequently to obtain information and support for the cancer patients under their care.⁹

In the field of cancer treatment, an increasing effort is being made to deliver technology-based care to improve patient outcomes. For instance, the Center for Health Enhancement Systems Studies is an organization of the University of Wisconsin–Madison that implements research and develops innovative health systems to optimize a person's health

behaviors, quality of life, and access to healthcare services.¹⁰ This interactive Internet-based communication system provides information, social support, and skills training to some cancer patients and caregivers. In Michigan, the program of family involvement, optimistic attitude, coping effectiveness, uncertainty reduction, and symptom management (i.e., FOCUS) has adapted an established communication and supportive-educational intervention for cancer patients and caregivers. This group has converted the intervention into an interactive Web-based format, to which participants have responded favorably regarding the usability of the intervention.¹¹ One National Clinical Trial registration described the design and methodology of a randomized controlled trial of Web-based caregiver alerts and tailored advice aimed at determining its efficacy in managing patients' symptoms related to chemotherapy.¹²

Which technology-based interventions are appropriate for cancer caregivers is unclear and likely depends on such factors as caregiver age, level of burden, geographic location, and availability of technological resources. The Family Caregiver Alliance, a community-based nonprofit organization funded through corporate and foundation grants, established the National Center on Caregiving with a mission to develop programs and services for caregivers in the community. The organization found that caregivers younger than 50 years and those with a greater caregiver burden were more likely to use technology related to caregiving and were more open to trying such a technology, although cost was a concern. Caregivers reported benefits that included time saving, easier logistics, making the care recipient feel safer, and making the caregiver feel more effective and less stressed.¹²

Technology holds promise as an effective medium of support to reduce cancer caregiver burden; what is unknown are the preferences, perceived benefits, and possible age differences of caregivers regarding the use of the technology. The purpose of the present project was to gather data needed to develop technology-based interventions for cancer caregivers through a survey designed to examine their current use of technology for personal and caregiving purposes, to evaluate their perception of benefits of technology-based tools for enhancing their caregiving, and to identify barriers to the use of such tools.

Materials and Methods

We conducted a prospective survey of adult caregivers of cancer patients who presented to an outpatient medical oncology clinic for a chemotherapy appointment at our institution. Surveys were administered over 6 months, from July through December 2012. A cover letter accompanied the survey, inviting

participants to complete the anonymous questionnaire and return the forms in a confidential drop box by the reception desk. Survey questions were based on a publicly published survey through the Family Caregiver Alliance regarding use of technology by caregivers.¹³ Permission was obtained from the Family Caregiver Alliance to use the survey, with some items modified and adapted for use in cancer caregivers. The Mayo Clinic Institutional Review Board approved this study.

DATA ANALYSIS

Study data were recorded using Research Electronic Data Capture (REDCap) tools hosted at Mayo Clinic¹⁴ and retrieved from REDCap for data analysis using SAS software (SAS Institute, Inc., Cary, NC). Descriptive summary statistics were computed for all caregiver demographic characteristics and for survey responses. Because of previous evidence that caregiver age may be a factor in caregiver willingness to use technologies, data were analyzed according to caregiver age in a comparison of caregivers younger than 65 years (nongeriatric) with those 65 years of age and older (geriatric). Similarly, data were compared through categories of high, medium, and low burden, calculated on the basis of the number of hours spent caregiving and the number of basic and instrumental activities of daily living (ADLs) that are performed.¹³ These comparisons used Wilcoxon methodology for continuous data and chi-squared or Fisher's exact methodology for discrete data. Logistic regression was used to determine whether caregiver characteristics were associated with technology use. Characteristics used in the models were burden level, caregiver age, caregiver sex, first-time chemotherapy for patient, age of patient, basic ADLs, instrumental ADLs, hours spent caregiving, caregiver education level, and caregiver employment.

Results

Of 275 distributed surveys, 119 (43%) completed surveys were returned. No information was collected on nonresponders. Of the 119 respondents, 112 identified themselves as cancer caregivers, defined as "having provided unpaid care to a relative or friend 18 years or older to help them take care of themselves because of illness due to cancer." "Unpaid care" was described to include helping with personal needs or household chores, managing the cancer patient's finances, arranging for outside services, or visiting regularly to see how the patient was doing.

CANCER CAREGIVER AND CARE RECIPIENT CHARACTERISTICS

Respondents comprised roughly equal numbers of geriatric ($n=54$) and nongeriatric ($n=58$) caregivers (Table 1). Based

Table 1. Caregiver and Patient Characteristics

Characteristic	Overall [% (N)]	Grouped by Caregiver Age [% (N)]			By Caregiver Burden [% (N)]			
		Geriatric (Age ≥ 65 years)	Nongeriatric (Age 18–64 years)	P value	High (N = 46)	Medium (N = 16)	Low (N = 50)	P value
Caregiver								
Age (years) (n = 108)								.52
18–34	6.3 (7)				10.9 (5)	0.0 (0)	4.3 (2)	
35–49	8 (9)				10.9 (5)	6.7 (1)	6.4 (3)	
50–64	39 (42)				37.0 (17)	33.3 (5)	42.6 (20)	
65–74	37 (40)				37.0 (17)	46.7 (7)	34.0 (16)	
75–84	8 (9)				2.2 (1)	13.3 (2)	12.8 (6)	
≥ 85	1 (1)				2.2 (1)	0.0 (0)	0.0 (0)	
Sex (n = 108)				.048				.11
Female	66 (71)	56 (28)	74 (43)		58.7 (27)	53.3 (8)	76.6 (36)	
Male	34 (37)	44 (22)	26 (15)		41.3 (19)	46.7 (7)	23.4 (11)	
Education level (n = 108)				0.38				.005
High school or less	16 (17)	20 (10)	12 (7)		13.0 (6)	33.3 (5)	12.8 (6)	
Some college or undergraduate	57 (61)	50 (25)	62 (36)		43.5 (20)	66.7 (10)	66.0 (31)	
Postgraduate	28 (30)	30 (15)	26 (15)		43.5 (20)	0 (0.0)	21.3 (10)	
Race/ethnicity (n = 112)				<.01				.48
White	95 (106)	89 (48)	100 (58)		97.8 (45)	100.0 (16)	100.0 (50)	
Nonwhite	5 (6)	11 (6)	0 (0)					
Religious affiliation (n = 105)				.19				.69
Protestant	44 (46)	47 (23)	41 (23)		43.2 (19)	60.0 (9)	39.1 (18)	
Catholic	31 (32)	37 (18)	25 (14)		29.5 (13)	20.0 (3)	34.8 (16)	
None	14 (15)	10 (5)	18 (10)		11.4 (5)	13.3 (2)	17.4 (8)	
Other	11 (12)	6 (3)	16 (9)		15.9 (7)	6.7 (1)	8.7 (4)	
Current employment (n = 96)				<.01				.80
Part-time	19 (20)	14 (7)	22 (13)		15.2 (7)	26.7 (4)	19.1 (9)	
Full-time	32 (34)	12 (6)	48 (28)		34.8 (16)	20.0 (3)	31.9 (15)	
Trying to work while patient receives treatment	81 (42)	77 (10)	82 (32)	.68	72.7 (16)	85.7 (6)	87.0 (20)	
Provides the most unpaid care to patient (n = 109)				.06				.46
You (caregiver respondent)	81 (88)	90 (46)	72 (42)		84.8 (39)	87.5 (14)	74.5 (35)	

continued →

Table 1. Caregiver and Patient Characteristics *continued*

CHARACTERISTIC	OVERALL [% (N)]	GROUPED BY CAREGIVER AGE [% (N)]			BY CAREGIVER BURDEN [% (N)]			
		GERIATRIC (AGE ≥ 65 YEARS)	NONGERIATRIC (AGE 18–64 YEARS)	P VALUE	HIGH (N = 46)	MEDIUM (N = 16)	LOW (N = 50)	P VALUE
You and someone else about equally	15 (16)	8 (4)	21 (12)		13.0 (6)	12.5 (2)	17.0 (8)	
Someone else	5 (5)	2 (1)	7 (4)		2.2 (1)	0.0 (0)	8.5 (4)	
Patient								
Age (years) (n = 109)				<.01				.66
18–34	6 (6)	0 (0)	10 (6)		8.7 (4)	6.3 (1)	2.1 (1)	
35–49	7 (8)	2 (1)	12 (7)		6.5 (3)	0.0 (0)	10.6 (5)	
50–64	27 (29)	12 (6)	40 (23)		28.3 (13)	31.3 (5)	23.4 (11)	
65–74	36 (39)	59 (30)	16 (9)		30.4 (14)	50.0 (8)	36.2 (17)	
75–84	24 (26)	28 (14)	21 (12)		26.1 (12)	12.5 (2)	25.5 (12)	
≥85	1 (1)	0 (0)	2 (1)		0.0 (0)	0.0 (0)	2.1 (1)	
Sex (n = 109)				.16				.27
Female	54 (59)	47 (24)	60 (35)		63.0 (29)	50.0 (8)	46.8 (22)	
Male	46 (50)	53 (27)	40 (23)		37.0 (17)	50.0 (8)	53.2 (25)	
Relationship to primary caregiver (n = 109)				<.01				.75
Spouse	69 (75)	94 (48)	47 (27)		67.4 (31)	81.3 (13)	66.0 (31)	
Parent	17 (18)	0 (0)	31 (18)		17.4 (8)	6.3 (1)	19.1 (9)	
Child	5 (5)	4 (2)	5 (3)		2.2 (1)	12.5 (2)	4.3 (2)	
Partner or significant other	4 (4)	0 (0)	7 (4)		4.3 (2)	0.0 (0)	4.3 (2)	
Sibling	4 (4)	0 (0)	7 (4)		4.3 (2)	0.0 (0)	4.3 (2)	
Friend or neighbor	3 (3)	2 (1)	3 (2)		4.3 (2)	0.0 (0)	2.1 (1)	
First chemotherapy session (n = 109)	34 (37)	39 (20)	29 (17)	.28				
Patient's illness or condition considered incurable by physicians (n = 109)	49 (53)	45 (23)	52 (30)	.68	45.7 (21)	56.3 (9)	48.9 (23)	.39

Percentages were based on nonmissing data.

on nonmissing responses among the 112 caregivers, 66% were women, 84% reported having at least a high school education, and 95% of the sample was white. Of the caregivers, 50% were employed, of whom 81% were trying to work while providing care for the patient. The majority of the caregivers reported that they provide most of the patient's care.

Care recipients were older than the caregivers, with 61% being 65 years of age and older and 25% being at least 75 years of age. Patients receiving care from geriatric caregivers

were predominantly spouses, whereas the patients with non-geriatric caregivers frequently were parents of the caregivers. About one-third of all patients were receiving chemotherapy for the first time.

CAREGIVER BURDEN

Caregiver burden is summarized in *Table 2*. Roughly one-third of caregivers (30%) spent 8 h or fewer per week providing care for patients; another one-third provided 9–20 h of

Table 2. Burden of Care

CAREGIVING ACTIVITIES	RESPONDENTS [% (M)] ^a
Level of care burden index (n=112) ^b	
Low	45 (50)
Medium	14 (16)
High	41 (46)
Average time (h) per week providing care (n=105)	
0–8	30 (31)
9–20	32 (34)
21–40	21 (22)
> 40	17 (18)
Help with basic ADLs	
Dressing (n=108)	40 (43)
Bed transfer (n=109)	39 (43)
Bathing (n=109)	30 (33)
Feeding (n=109)	20 (22)
Toileting (n=109)	19 (21)
Incontinence (n=109)	17 (18)
Basic ADLs performed (number) (n=108)	
0	46 (50)
1	13 (14)
2	8 (9)
3	12 (13)
4	7 (7)
≥ 5	14 (15)
Help provided with IADLs	
Transportation (n=109)	91 (99)
Meal preparation (n=109)	89 (97)
Housework (n=107)	88 (94)
Grocery shopping (n=107)	88 (94)
Financial management (n=108)	73 (79)
Medication management (n=107)	53 (57)
Arrangement or supervision of paid services (n=104)	20 (21)
IADLs performed (number) (n=109)	
0	5 (5)
1	1 (1)
2	3 (3)

Table 2. continued

CAREGIVING ACTIVITIES	RESPONDENTS [% (M)] ^a
3	6 (7)
4	16 (17)
≥ 5	70 (76)
^a Percentages were based on nonmissing data.	
^b Based on hours of care provided and number of basic activities of daily living (ADLs) and instrumental ADLs (IADLs) performed.	

care per week. Of survey respondents, 38% spent more than 20 h/week providing care. Only one-half of the caregivers provided assistance with basic ADLs such as bathing or feeding; however, it was common to assist with non-personal care needs, termed “instrumental ADLs,” which included activities such as transportation and meal preparation. The overall caregiver burden, based on the number of hours spent caregiving and number of basic and instrumental ADLs performed, was “low” in 45%, “medium” in 14%, and “high” in 41% of caregivers. No differences were found between geriatric and nongeriatric caregivers on these variables.

CAREGIVER USE OF AND RECEPTIVITY TO TECHNOLOGY

Table 3 summarizes caregiver technology use, receptivity to technology, and tendency to adopt new technology. Comparisons are made by age (i.e., geriatric and nongeriatric) and level of caregiver burden (i.e., high, medium, and low). Almost all caregivers had Internet access and e-mail. Social networking, smartphones, and other mobile wireless devices were more frequently used by nongeriatric caregivers. Of respondents, 85% endorsed willingness to access Internet-based tools that help caregivers. Fewer than one-third of respondents reported having used an electronic organizer or calendar to help them with caregiving, approximately one-fourth had used the Internet to search for caregiving-related information or support, and few had participated in a caregiving-related blog or online discussion forum (n=4) or had used other technological devices or systems (n=6) (e.g., personal emergency response systems, symptom monitors that transmit data to physicians, electronic safety sensors, electronic personal health records, video monitoring). No differences were found among caregivers of high, medium, or low burden with regard to use of the Internet or technology to help with caregiving. A subset analysis to compare the high- and low-burden groups only also revealed no differences. Logistic regression determined no significant findings for age or caregiver burden predicting technology use.

Table 3. Caregiver Technology Use Among Survey Respondents

TECHNOLOGY USE QUESTIONS	ALL CAREGIVER RESPONDENTS [% (N)] (N= 112)	GROUPED IN ACCORDANCE WITH						
		CAREGIVER AGE [% (N)]			BY CAREGIVER BURDEN [% (N)]			
		AGED ≥ 65 YEARS (N= 54)	AGED 18–64 YEARS (N= 58)	P VALUE	HIGH (N= 46)	MEDIUM (N= 16)	LOW (N= 50)	P VALUE
Internet usage								
Internet access	94 (105)	89 (48)	98 (57)	.12	87.0 (40)	100.0 (16)	98.0 (49)	.18
Wireless	71 (79)	59 (32)	81 (47)	.01	67.4 (31)	68.8 (11)	74.0 (37)	.77
High-speed	78 (87)	76 (41)	79 (46)	.67	69.6 (32)	87.5 (14)	82.0 (41)	.20
Cable TV	71 (80)	76 (41)	67 (39)	.31	63.0 (29)	87.5 (14)	74.0 (37)	.15
E-mail	91 (102)	85 (46)	97 (56)	.10	82.6 (38)	100.0 (16)	96.0 (48)	.12
Social network account	47 (53)	30 (16)	64 (37)	< .01	47.8 (22)	43.8 (7)	48.0 (24)	.67
Smartphone	44 (49)	30 (16)	57 (33)	.01	54.3 (25)	37.5 (6)	36.0 (18)	.27
Other mobile wireless device	55 (61)	35 (19)	72 (42)	< .01	69.6 (32)	43.8 (7)	44.0 (22)	.10
Comfortable and willing to access Internet-based tools that help caregivers	85 (95)	76 (41)	93 (54)	.04	82.6 (38)	93.8 (15)	84.0 (42)	.78
Current use to help with caregiving								
Use electronic organizer or calendar in some way related to caregiving (n= 108)	27 (30)	22 (11)	33 (19)	.13	30.4 (14)	25.0 (4)	26.1 (12)	.56
Search for caregiving-related information or caregiving support on the Internet (n= 108)	23 (26)	18 (9)	30 (17)	.11	28.3 (13)	12.5 (2)	23.9 (11)	.36
Use other technological devices or system (n= 108)	5 (6)	4 (2)	7 (4)	.68	10.9 (5)	6.3 (1)	0.0 (0)	.11
Participate in blog or online discussion forum related to caregiving (n= 108)	4 (4)	0 (0)	7 (4)	.10	6.5 (3)	6.3 (1)	0.0 (0)	.08
Tendency to use and adopt new technology								
Wait a little to see that new technologies are tested then adopt them	40 (45)	32 (17)	48 (28)	0.07	45.7 (21)	31.3 (5)	38.0 (19)	.55
Wait until a technology is widely used before trying it	29 (32)	37 (20)	21 (12)	.06	21.7 (10)	37.5 (6)	32.0 (16)	.37
One of the very last to try something new	21 (24)	30 (16)	14 (8)	.04	19.6 (9)	25.0 (4)	22.0 (11)	.89
Try new technologies when they are relatively new, before most others	9 (10)	0 (0)	17 (10)	< .01	10.9 (5)	6.3 (1)	8.0 (4)	.82

continued→

Table 3. Caregiver Technology Use Among Survey Respondents *continued*

TECHNOLOGY USE QUESTIONS	ALL CAREGIVER RESPONDENTS [% (M)] (N=112)	GROUPED IN ACCORDANCE WITH						
		CAREGIVER AGE [% (M)]			BY CAREGIVER BURDEN [% (M)]			
		AGED ≥ 65 YEARS (N=54)	AGED 18–64 YEARS (N=58)	P VALUE	HIGH (N=46)	MEDIUM (N=16)	LOW (N=50)	P VALUE
Receptivity to technology								
How receptive would you be to using a smartphone or other mobile device for applications to help you with caregiving? (n=111)				<.01				.85
Very receptive	42 (47)	32 (17)	52 (30)		46.7 (21)	37.5 (6)	40.0 (20)	
Somewhat receptive	26 (29)	19 (10)	33 (19)		28.9 (13)	25.0 (4)	24.0 (12)	
A little receptive	10 (11)	13 (7)	7 (4)		8.9 (4)	6.3 (1)	12.0 (6)	
Not receptive	22 (24)	36 (19)	9 (5)		15.6 (7)	31.3 (5)	24.0 (12)	

All percentages are computed using the sample size indicated by the column headers unless indicated.

The survey also listed and described 13 technological systems or devices that can be used to help caregivers: decision support tools; online support groups and discussion boards; coaching software; mentor-matching services; training simulations; video phone systems; caregiving coordination systems; symptom monitors and transmitters; medication support systems; interactive systems for physical, mental, and leisure activities; passive movement monitoring systems; transportation displays; and personal health record tracking.¹³ Caregivers were asked whether they used these technologies and, if not, whether they would be likely to use such technologies if available and with all fees paid. Of the 13 technologies, the personal health record tracking was the most commonly used (18 [17%]), followed by the decision support tool (15 [14%]). Caregivers reported not using the other technologies, and response was minimal to the items on the likelihood of using them.

TECHNOLOGY ADOPTER STATUS AND RECEPTIVITY TO TECHNOLOGY

Nongeriatric caregivers reported being more likely to adopt new technologies early or before most other users, whereas geriatric caregivers said they tended to be the last ones to try something new (Table 3). The majority of the caregivers were receptive to using a smartphone or other mobile device for applications to help them with caregiving, although—and as expected—the nongeriatric caregivers were more receptive than their geriatric counterparts. However, no differences were found among caregivers when compared for level of caregiver burden.

INFORMATION SOURCE AND PERCEIVED BENEFITS OF CAREGIVING TECHNOLOGIES

The sources that caregivers trusted most frequently for information to help them decide on using caregiver technologies were medical Web sites, such as WebMD and mayoclinic.com (the latter finding may be biased because respondents were caregivers of Mayo Clinic patients), followed by government Web sites, such as Medicare and the National Cancer Institute (Table 4). The majority of caregivers perceived many benefits to using caregiving technologies, although nongeriatric caregivers perceived more benefits than geriatric caregivers with respect to saving time, reducing feelings of depression, increasing feelings of being effective as a caregiver, improving quality of life, and making caregiving easier logistically.

Discussion

New technologies hold great promise for reducing caregiver burden. However, before effective technology-based interventions can be designed and implemented for cancer caregivers, more information needs to be learned about cancer caregiver preferences and the perceived benefits of technology for reducing caregiver burden. The present survey provided such information. Results indicated that cancer caregivers use technology, are receptive to the use of technology, and recognize the benefits of using technology to reduce caregiver burden. These findings show that regardless of the caregiver's age or level of burden, caregivers are using technology. The combination of active technology use and

Table 4. Information Sources and Perceived Benefits of Caregiving Technologies

SURVEYED TECHNOLOGY USE	RESPONSES [% (N)] (N = 112) ^a				
	NOT AT ALL	A LITTLE	SOMEWHAT	A GREAT DEAL	NOT FAMILIAR
Influence of information source ^b					
Medical Web site (e.g., WebMD, mayoclinic.com)	7 (8)	4 (4)	13 (14)	68 (74)	7 (8)
Government Web site (e.g., Medicare, National Cancer Institute)	17 (18)	12 (13)	31 (34)	33 (36)	6 (7)
Caregiving magazine or Web site	8 (9)	17 (19)	45 (49)	19 (21)	7 (8)
Caregivers forum on the Internet	16 (17)	23 (25)	33 (36)	17 (19)	10 (11)
Consumer review Web site	18 (20)	20 (22)	35 (38)	16 (17)	10 (11)
Store (e.g., Best Buy) that might sell the technology	31 (34)	23 (25)	33 (36)	6 (7)	6 (6)
Perceived benefits of use ^c					
Increase feelings of being effective as a caregiver ^d	10 (11)	11 (12)	36 (39)	37 (40)	6 (6)
Make caregiving easier logistically ^d	13 (14)	17 (18)	28 (31)	34 (37)	7 (8)
Reduce level of stress	12 (13)	17 (18)	29 (32)	33 (36)	8 (9)
Make patient feel safer	14 (15)	17 (19)	29 (32)	30 (33)	8 (9)
Prevent burnout	11 (12)	20 (22)	32 (35)	29 (32)	6 (7)
Improve quality of life ^d	10 (11)	23 (25)	33 (36)	25 (27)	8 (9)
Make patient feel more connected to others	19 (20)	16 (17)	26 (28)	25 (26)	12 (13)
Save time ^d	13 (14)	20 (22)	34 (37)	24 (26)	8 (9)
Make patient more independent	18 (20)	14 (15)	34 (37)	22 (24)	11 (12)
Reduce feelings of depression ^d	18 (20)	18 (20)	28 (31)	20 (22)	14 (15)
Reduce physical demands on body	15 (16)	28 (31)	29 (32)	19 (21)	7 (8)
Save money	31 (34)	25 (27)	20 (22)	9 (10)	14 (15)

^aResults reported may not total exactly 100% because of rounding, missing data, and the opportunity for the caregiver to select the "not familiar" or "don't know" response or allowable multiple responses.

^bResponse to the question "How much, if at all, would you trust information from the following sources to help you decide whether you wanted to use one of the technologies presented in this survey?"

^cResponse to the question "How much, if at all, would you expect using caregiving technologies to result in each of the following benefits?"

^dStatistically significant difference between geriatric and nongeriatric caregivers ($p < 0.05$).

perceived benefits of technology provides support for the development of technology-based interventions to reduce cancer caregiver burden.

Caregivers in our survey reported medium to high levels of burden, which is consistent with the finding of profound fatigue in cancer caregivers in a recent Mayo Clinic study.¹⁵ These findings highlight the importance of developing strategies to reduce caregiver burden. Whether and how the level of caregiver burden influences the use of technology are unknown. Caregivers with high burden may have greater need and use of technology or, conversely, lesser if they are too busy with caregiving responsibilities to learn or make use of

these technologies. Future studies to determine which level of caregiver burden would be targets for technology-based interventions would be useful. Fortunately, our survey also showed that most caregivers had a positive perception of technology to potentially reduce their burden.

Both geriatric and nongeriatric caregivers in our study frequently used technology. However, the general perception that older persons are not as technologically savvy as younger persons is mostly supported by our results. The younger (nongeriatric) caregivers were more likely to use social media, have a smartphone or wireless device, search for caregiving-related information on the Internet, perceive more benefit

from the use of technology, and adopt new technologies faster. These findings were similar to a survey by Weinberg et al.,¹¹ of 534 primary care patients that described a difference in use of technology between older (age ≥ 60 years) and younger (age 15–39 years) patients, although the majority of the older adults in that study reported using cellular phones, the Internet, and e-mail. Our study also found that geriatric caregivers had these technology basics.

In our survey, nongeriatric caregivers endorsed more comfort and willingness to access Internet-based tools to help with their caregiving role compared with geriatric caregivers. However, as technology advances and becomes easier to learn and use, hopefully these gaps between geriatric caregivers and nongeriatric caregivers will become smaller.

Our survey of cancer caregivers showed several interesting comparisons with and contrasts to the Health Information National Trends Survey (HINTS) Cycles 1 through 3 (October 2011–December 2013).¹⁶ Among our cancer caregivers, 91% had e-mail access, compared with a national general population survey of 73.6%. In addition, 47% (30% of geriatric and 64% of nongeriatric) of our caregivers had a social networking account, compared with 16.8% of the general population who endorsed the use of a social networking site to read and share information about medical topics. Of note is that this use comparison of social networking sites may not be valid because the survey questions were slightly different, but both HINTS and our survey contained the concept of using a social networking site. Of our caregivers, 44% (30% of geriatric and 57% of nongeriatric) had a smartphone, compared with 15% of the general population.

Our survey was performed in 2012, which is in the time frame of the HINTS Cycles 1 through 3. One potential similarity between the survey findings was the use of online forums. Four percent of our caregivers, all of whom happened to be nongeriatric, reported participating in an online forum related to caregiving. By comparison, in the general population of HINTS Cycle 1, 4.7% endorsed using an online support group for people with a similar health or medical issue, and that percentage increased to 6.6% by HINTS Cycle 3. Another potential similarity regarded the use of Internet or technology to organize health information, including appointments: 27% (22% geriatric and 33% nongeriatric) of our caregivers used an electronic organizer or calendar in some way related to caregiving versus the HINTS survey, in which 21.1% reported using the Internet for personal health information, including appointments. Overall, our cancer caregiver sample had more access and comfort with technology than a general national population.

In summary, a majority of cancer caregivers in our study have access to and are frequent users of technology regardless

of age and level of caregiving burden, more so than in a general national population survey, and have positive perceptions regarding the potential benefits of technology to address cancer caregiver burden and burnout. Given these responses, a technology-based intervention to assist the cancer caregiver in meeting the needs of the cancer patient, while allowing the caregiver to maintain or improve his or her own quality of life and alleviate burden, could be developed and widely used. The design of such an intervention should take into account the caregiver's sex, age, patient relationships, and easier-to-use technologies.

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No competing financial interests exist.

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Address correspondence to:

Maria I. Lapid, MD
Department of Psychiatry and Psychology
Mayo Clinic
200 First Street SW
Rochester, MN 55905

E-mail: lapid.maria@mayo.edu

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