Internet-based Computerized Patient Assessment System (iComPAssS): a cross-sectional analysis of needs, acceptance and readiness among adult cancer patients in a tertiary care center

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Background: Data on the attitude and perception of adult Filipino cancer patients towards health-related information and communications technology (ICT) and prevalence of access to, willingness to use of and actual usage of ICTs are lacking. We sought to assess the needs, acceptance and readiness of our cancer patient population for a web-based patient-reported outcomes capture system (WPROCS), eventually to be called Internet-based Computerized Patient Assessment System (iComPAssS) in order to guide us in its development.

Methods: We conducted a cross-sectional survey among adult cancer patients consecutively seen at our institute, using previously developed questionnaires [WPROCS-Needs, Acceptance and Readiness Assessment (NARA) Questionnaires]. The influence of socio-demographic variables and computer and internet access and usage on attitude and perception towards health-related ICT, willingness to acquire materials, undergo training for its use, and to actually use it was examined using multiple regression analysis.

Results: The majority of our respondents (n=130; median age 44, range 28–80) were aged less than 60 (90%), females (78%) and with secondary schooling (98%). The majority (81%) reported good health but 74% reported significant health needs; 85% reported easy access to health care or advice but only 38% reported prompt delivery of health care or advice. The majority (≥95%) have a positive attitude and perception of the idea, and about 90% were willing to acquire materials or undergo training. The only socio-demographic variable that was predictive of acceptance of ICT, willingness to acquire materials, undergo training for its use, and actually use it was younger age. Higher education and income were associated with acceptance of ICT. Frequency of computer/internet use, previous training, and possession of mobile devices to access internet were predictive of acceptance and willingness to acquire materials for ICT use. Internet use for civic and political information and professional life were associated with willingness to acquire materials while internet use in communicating with relatives were associated with willingness to learn ICT usage and to actually use it.

Conclusions: Overall, our findings support an opportunity for improving monitoring patient-reported outcomes (PROs) through ICT in our setting.

Keywords: Information and communications technology; telemedicine; patient-reported outcomes; cancer

Introduction

Patient-reported outcomes (PROs) have been previously demonstrated to be prognostic for overall survival and might be useful for stratification purposes (1). Symptom self-reporting during cancer care has been associated with improved clinical outcomes possibly due to early responsiveness to patient symptoms and improved tolerance and compliance to treatment (2,3). High symptom burden is seen among adult cancer patients at our center, with early- and advanced-stage disease alike (4). Limited ambulatory capacity and logistic issues hinder prompt communication and intervention for distressing symptoms especially among elderly or terminally ill cancer patients, as well as deter long-term follow-up for cancer surveillance and late toxicity monitoring and management particularly for patients originating from areas remote to our center.

The feasibility and practicality of administering symptom questionnaires and psychological distress screening to cancer patients through touch-tone telephones have been demonstrated (5). Two systematic reviews showed that the use of information and communication technology (ICT) applications in home care and patient empowerment among chronically ill patients helps them gain control of their lives, improve health status and quality of life, and reduce need for supportive care (6,7). However, qualitative data as to how adult Filipino cancer patients perceive the burden and benefit of follow-up is lacking. Similarly, the prevalence of access to, willingness to use of, and actual usage of such technologies among our cancer patients is currently unknown. For this purpose, we have developed the Web-based Patient Reported Outcomes Capture System-Needs, Acceptance and Readiness Assessment (WPROCS-NARA) Questionnaire (8). We undertook this study to guide subsequent development of a web- and/or short message service (SMS)-based application to facilitate symptom screening and evaluation of symptom management outcomes through remote symptom-reporting.

The objective of this study was to determine the perception and attitudes of adult Filipino cancer patients towards use of ICT for monitoring of PROs. Specifically, we sought to determine factors related to health, health status and access to health care that would influence potential usage of health-related ICT; evaluate the perception and attitude of cancer patients towards use of health-related ICT, in particular, for monitoring of PROs; and to evaluate access to and actual usage of the internet and telecommunications among cancer patients.

Methods

The study was approved by the University of Santo Tomas Hospital Institutional Review Board.

Study design and location

This cross-sectional study was conducted at the University of Santo Tomas Hospital-Benavides Cancer Institute (USTH-BCI), a tertiary care cancer center in Manila, Philippines that offers comprehensive cancer treatment for pediatric and adult cancer patients. The USTH-BCI caters to an average of 1,600 adult patients annually. Up to 50% are from outside Metro Manila (Metro Manila, 50%; rest of Luzon, 44%; Visayas, 4%; Mindanao, 1%; outside Philippines, <1%), 39%, aged 60 and above, and 31%, with advanced cancers.

Study population, sample size, and recruitment

The study included consecutive cancer patients at least 18 years of age seen at the USTH-BCI from January 01, 2014 to December 31, 2014.

In 2013, the USTH-BCI has registered 1,463 cancer cases, of which, 1,383 were adults. Of these, 21% had breast, 12% head-and-neck, 12% colorectal, 12% gynecologic and 8% thyroid primaries. Among those registered adult cases, 35–50% eventually would need and undergo any form of treatment at the USTH-BCI. Using Epi Info 7, a minimum of 82 patients was computed to be needed to achieve an 80% power of a study given a population size of 1,383, confidence limit of 10% and an expected frequency of cancer patients who receive treatment of 35%. Note that 10% confidence interval was used for the study as this is considered to produce estimates that are closer approximations to the exact values compared to 5% confidence limits (9).

Recruitment was conducted in the outpatient radiotherapy and chemotherapy units, multidisciplinary tumor clinics, medical and surgical oncology wards, and pain and palliative unit. Patients with cognitive impairment or clinical condition that precluded self-assessment of symptoms were excluded from the study. All patients who agreed to participate gave a written informed consent.

Data collection

Demographic data (age, gender, marital status, educational attainment, occupation, address, and living setup) were

obtained from semi-structured interviews with the patient and/or accompanying person/s. Clinical data (oncologic diagnosis, stage, clinical status, treatment received, and concurrent illnesses) were collected from medical records; missing data, and when necessary, confirmation or clarification, were obtained from the patient and/or accompanying person/s. Karnofsky performance status score was assigned by an investigator at the time of the interview.

The survey was conducted using the WPROCS-NARA Questionnaires. This instrument was developed particularly for the objectives of this study and its validation is described elsewhere (8). It consists of three questionnaires—a Needs Assessment Questionnaire (NAQ), Acceptance Assessment Questionnaire (AAQ) and a Readiness Assessment Questionnaire (RAQ).

The NAQ consists of five sections and 30 questions exploring (I) overall and emotional health, and need for home care, urgent care and hospitalization; (II) symptoms and distressing symptoms, and pain and symptom medications; (III) weight change, problems with eating and need for tube feeding; (IV) quality of primary doctor and social support, source of professional health care and advice outside the hospital, and ease of access to health care or advice; and (V) ambulatory capacity, disability, and ease of access to the closest clinic or hospital, our hospital (USTH-BCI) and the primary doctor.

The AAQ consists of two sections and 12 questions exploring (I) age, gender, address, annual individual income and highest educational attainment, and (II) attitude towards WPROMS, perceived logistic capacity and competency to use such a system, and willingness to acquire materials, equipment, knowledge and/or access to the system when lacking.

The RAQ consisted of four sections and 17 questions exploring the following aspects in the last 3 months: (I) computer and internet access at home, and reasons for lack of (4 items); (II) frequency of computer use (2 items); (III) frequency, location, mode and purposes of internet access or use (5 items); and (IV) computer and internet skills training and perceived competence (6 items). Questions were constructed in two-way, single- or multiple-response, multiple-choice formats.

The questionnaires were administered in either English or Filipino, in the presence of an investigator.

Statistical analyses

Data were summarized as descriptive statistics. The influence of socio-demographic variables and computer and internet access and usage on attitude and perception towards health-related ICT, willingness to acquire materials and undergo training for its use, and willingness to actually use it was examined using multiple regression analysis.

Selection and information bias

This survey was conducted in a single-institution by consecutive sampling. To reduce selection bias, we recruited from both in-patient and out-patient departments. To reduce information bias and preserve information quality, patients were encouraged to respond to all of the questions as honestly as they can, and in the presence of any one of the investigators, who provided clarification as necessary.

Results

Baseline characteristics of patients

A total of 130 respondents took the survey. Median age was 44 [28–80]. The majority were aged less than 60 (90%), females (78%), and with secondary schooling (98%). Patient characteristics are summarized in *Table 1*.

ICT access and usage

The majority had access to computer (97%) and internet (95%) at home; used the computer (94%) and the internet (91%) at least once weekly; and accessed the internet from mobile devices (95%) (*Table 2*). Among those who did not have access to internet at home (n=7), deterrent factors were equipment costs (n=3), access costs (3), regional logistic issues (1) lack of skills (1), and lack of perceived need (1).

The majority reported competence in online communication (90%), protection of personal data (78%), and protection of private computer from virus or other infection (77%) (*Table 3*). The top uses of the internet were communication via social networks (94%), general information (87%), current events and information (73%), health-related information (65%), civic or political forums (52%), and communication via voice or video calls (51%).

Healthcare and needs

The majority reported good (7–10, in a scale of 0–10, where 0 is worst and 10 is best) overall health (81%) and mental or emotional health (98%). A significant number needed

Table 1 Baseline patient characteristics (n=130)

Variables	N	%
Demographic variables		
Age		
Under 60	117	90
60 and above	13	10
Gender		
Male	29	22
Female	101	78
Marital status		
Married	107	82
Never married	20	15
Widow/widower	3	2
Educational attainment		
No formal schooling	0	0
Some high school	0	0
Graduated high school	2	2
Vocational/technical school	4	3
Some college	10	8
Graduated college	114	88
Post-graduate study	0	0
Employment		
Employed	42	32
Other	88	68
Annual individual income		
<Php 100,000 (<USD 2,000)	2	2
≥Php 100,000 to <Php 200,000 (≥USD 2,000–<USD 4,000)	1	1
≥Php 200,000 to <Php 400,000 (≥USD 4,000–<USD 8,000)	44	34
≥Php 400,000 (≥USD 8,000)	83	64

Table 1 (*continued*)

Table 1 (*continued*)

Variables	N	%
Medical variables		
Stage		
I	13	10
II	40	31
III	43	33
IV	15	12
Unknown	17	13
Not applicable (hematologic, brain)	2	2
Clinical status		
Newly diagnosed	5	4
Active treatment	117	90
Survivor	8	6
Performance status		
0	70	54
1	38	29
2	17	13
3	5	4
4	0	0

consultations outside scheduled check-ups (53%) and needed urgent care (31%). Up to 40% reported significant need (7–10 in a scale of 0–10, where 0 is least and 10 is most significant) for home healthcare, including help with personal care (50%), routine needs (74%), and ambulation (22%). No one had a tracheostoma, 22% had a gastrostomy tube. The most prevalent symptoms were pain (77%),

distress (75%), fatigue (61%), sadness (55%) and lack of appetite (49%) (*Table 4*). The respondents commonly took medications for pain (50%), vomiting (19%), disturbed sleep (15%) and feeling of distress (14%). Nearly all (98%) took their medications solely by mouth.

The majority relied solely on the hospital or clinics for healthcare and advice (95%). Up to 85% reported easy access to health care or advice all the time, but only 38% reported receiving expedient delivery of urgent health care or advice all the time. Up to 17% needed at least an hour to reach the closest clinic or hospital, 24%, to reach our hospital, and 12%, to access their primary doctor other than in our hospital. Nearly all reported good social support (7–10 in a scale of 0–10, where 0 is worst and 10 is best) from their family (100%) and friends (98%) (*Table 5*).

Perception and attitude towards ICT use in monitoring PROs

The majority of the respondents thought that the use of ICT in monitoring PROs was a good idea (96%) and

Table 2 Computer and internet access and use (n=130)

Items	%
Access to computers and the internet	
Computer at home	97
Internet at home	95
Frequency of computer use	
Every day or almost every day	52
At least once a week (not every day)	42
At least once a month (not every week)	0
Less than once a month	2
Never used	4
Frequency of internet use	
Every day or almost every day	62
At least once a week (not every day)	29
At least once a month (not every week)	0
Less than once a month	3
Never used	5
Mobile Internet use[a]	
Tablet	58
Mobile phone or smartphone	52
Laptop	8
Other	3
No	5

[a], multiple-response question.

Table 3 Computer and internet training and skills (n=130)

Items	%
Last training course on computer use	
Never	90
More than 3 years ago	7
Within the last 3 years	3
Reason/s for not taking a training course in the last 3 years[a]	
Self- or peer-assisted study	54
Lack of time	19
Sufficient skills	13
No suitable offer on content available	5
Costs	2
Others	6
Perceived competencies	
Online communication	90
Protection of personal data	78
Protection of private computer from virus or other infection	77

[a], multiple-response question.

liked it (95%); that they had the necessary materials and equipment (90%) and knowledge (87%) to use the system, and were willing to acquire the material and equipment (88%) and knowledge (91%), if lacking; and would like to use the system (98%) (*Table 6*).

Discussion

The majority of our cohort reported good overall health condition (81%) despite 31–74% reporting significant health needs, 77% reporting weight loss, 52% reporting feeding problems. Nearly all reported good mental or emotional health (98%). These seem attributable to good patient-physician relationship (100%), good social support from family (100%) and friends (98%). The majority relied on the clinic or hospital for health care and advice (95%), and report easy access to health care or advice always (85%). However, only 38% report prompt delivery of health care or advice in urgent need. Whether this is due to time delay to access to facility (up to 65% need at least 30 minutes to get to a facility; up to 74% require at least 30 minutes to get to the primary doctor), or to time delay from arrival to hospital to receipt of service, or both could not be ascertained from our data, and needs to be identified and addressed. Still, PROs monitoring by ICT can potentially improve detection of distressing symptoms and facilitate prompt intervention, thereby lessening the need for urgent care.

On multiple linear regression analysis, the only socio-demographic variable that was predictive of positive attitude and perception of ICT, willingness to acquire materials and undergo training for its use, and intention to actually use it was younger age. Higher education and income were only associated with positive attitude and perception, while other demographic variables such as sex, occupation and civil status were not found to be significant factors.

Frequency of computer and/or internet use, previous training course in any aspect of computer use, and possession of mobile devices to access internet away from home or work were all predictive of positive attitude and perception of ICT

Table 4 Health status and healthcare needs (n=130)

Items	%
Health status	
Overall health condition[a]	
Good	81
Average	19
Poor	0
Mental or emotional health[a]	
Good	98
Average	2
Poor	0
Health needs	
Frequent consultation outside scheduled check-ups[b]	53
Frequent need for urgent care[b]	31
Frequent hospitalization[b]	1
Significant home healthcare assistance or nursing[c]	40
Assistance with routine needs	50
Assistance with personal needs	74
Symptoms	
Pain	77
Distress	75
Fatigue	61
Sadness	55
Lack of appetite	49
Dry mouth	49
Problem with remembering things	34
Disturbed sleep	30
Nausea	21
Vomiting	20
Numbness or tingling	20
Shortness of breath	18
Drowsiness	2
Feeding and nutrition	
Weight loss	72
Weight gain	17
Feeding problems (not lack of appetite)	52
Nasogastric tube	0
Gastrostomy tube	22

[a], poor, 0–3; moderate, 4–6; good, 7–10; [b], >3 occasions in the last 3 months; [c], rated 7–10 on a scale of 0–10.

and willingness to acquire materials for its use. Ability to carry out common computer and/or internet commands, use of internet for civic and political information and professional life, and computer or internet skills for protecting personal data and for purposes of searching for or changing jobs were associated with willingness to acquire materials for ICT use. While access to computer and/or internet at home and computer or internet skills in communicating with relatives were associated with willingness to learn ICT use and to actually use it.

Indeed, higher internet use among cancer patients has been shown to increase active participation in medical decision making (10). However, using the internet for content and unregulated forums can lead to misinformation or over-information leading to confusion or undue anxiety. On the other hand, using the internet for communication among the patient, family and health professional leads to quality social support, shared decision-making and improved compliance, resulting in improved cancer outcomes and satisfaction (11). A less desirable mechanism is the use of online self-management support, which was highly used by patients with low levels of social support and high levels of symptom distress and depression (12). The feasibility and practicality of administering symptom questionnaires and psychological distress screening to cancer patients through touch-tone telephones have been demonstrated (5).

In the Philippines, ICT was first integrated in healthcare with the establishment of the University of the Philippines–Manila National Telehealth Center in 1998. Currently, the UPM NTHC engages in the application of ITC on health education and training, electronic patient medical records, medical/surgical specialty referral systems, health policy advocacy, and monitoring performance in reaching goals of the Department of Health (DOH) priority programs. For such systems to be truly useful, user-centered design approaches and appreciation of the sociotechnical aspects of complex systems are both important (13). For instance, increasing internet access alone will not reduce but rather further contribute to disparities in healthcare, as physician-patient interaction relates to the socioeconomic status of the patient rather than internet use (14). The patients' information needs and preferences to resources need to be identified and understood.

Since our institute caters to patients not only from the country's urban areas but also from rural areas, the investigators foresee that patients will identify a wide variety of barriers to clinic visits. Also, given that present data has shown that Filipinos are one of the top users of the

Table 5 Healthcare access and support (n=130)

Item	%
Access to health care and advice	
Source/s of professional health care and advice outside the hospital or clinics	
None	95
Caregiver	4
Personal nurse	1
Ease of access to health care or advice	
Always	85
Usually	8
Sometimes	7
Never	0
Expedient delivery of health care or advice in urgent need	
Always	38
Usually	55
Sometimes	6
Never	0
Satisfaction with primary doctor[a]	
Good	100
Moderate	0
Poor	0
Access to healthcare facility	
Time to access to closest clinic or hospital	
<15 minutes	24
15–30 minutes	11
30 minutes–<1 hour	48
1–2 hours	13
>2 hours	4
Time to access to treating hospital (USTH-BCI)	
<15 minutes	52
15–30 minutes	22
30 minutes–<1 hour	2
1–2 hours	19
>2 hours	5
Time to access to primary doctor (other than in USTH-BCI)	
<15 minutes	23
15–30 minutes	4
30 minutes–1 hour	62
1–2 hours	8
>2 hours	4

Table 5 (*continued*)

Table 5 (*continued*)

Item	%
Access capability	
Mobility	
Ambulatory	78
Ambulatory, with cane or walker	0
Ambulatory, with assistance	22
Disability (blindness, hearing, speech or mobility impairment)	0
Social support	
From family[a]	
Good	100
Moderate	0
Poor	0
From friends[a]	
Good	98
Moderate	2
Poor	0

[a], rated on a scale of 0–10: poor, 0–3; moderate, 4–6; good, 7–10.

internet and telecommunication technology in the world, the investigators expect to find a favorable response from the respondents regarding the use of ICT in healthcare. By determining actual access and usage of ICT and identifying factors that can influence potential usage of health-related ICT, the investigators may be guided in future development of health-related ICT.

Our population represents a defined demographic, mostly females under 60, with secondary schooling, with good knowledge and access to computers and the internet. While most have good perceived overall health, emotional or mental health and social support, up to 40% reported significant need for home healthcare, 22% need assistance with ambulation, and up to 17% have difficult access to the nearest clinic or hospital. The majority (≥95%) have a positive attitude and perception of the idea, and nine out of ten are willing to acquire materials or undergo training if necessary. A similar survey may be conducted particularly among geriatric and male populations, and among populations with lesser knowledge and/or access to computers and the internet.

Overall, our findings support an opportunity for improving monitoring PROs through ICT in our setting. We have subsequently conducted a clinical trial investigating the utility of a remote-symptom monitoring

Table 6 Perception of and attitude towards ICT use for PROs (n=130)

Items	%
Thinks the system is a good idea	
4[a]	96
3	2
2	1
1	1
Likes the idea of using the system	
4	95
3	5
2	0
1	1
Perceives to have the materials necessary to use the system	
4	90
3	4
2	0
1	6
Perceives to have the knowledge to use the system	
4	87
3	11
2	2
1	1
Willing to acquire the materials if lacking	
4	88
3	9
2	2
1	1
Willing to acquire the knowledge if lacking	
4	91
3	5
2	4
1	0
Will use the system if the materials, equipment, knowledge and access to the system are available	
4	98
3	1
2	1
1	0

[a], using a 4-point Likert scale, where 4 reflects sentiment that is strongly compatible to the statement, and 1 reflects sentiment that is strongly opposite to the statement.

application in pain control and management among cancer patients, the results of which are reported elsewhere (15,16).

Footnote

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