Health Information Technology Department
Mashhad University of Medical Sciences

In the name of God

Mashhad University of Medical Sciences

Internet-based technologies to improve cancer care coordination: Current use and attitudes among cancer patients

Lecturer Name: Alireza Banaye Yazdipour

Supervisor Name: Dr. Khalil Kimiafar

Email Address: bannaya961@mums.ac.ir

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ANNE GIRAULT

دانشجوی دکترا مدیریت سازمان های بهداشتی
دانشکده بهداشت عمومی
دانشگاه پیر و ماری کوری
فرانسه

Affiliation

Ecole des hautes études en santé publique

Location
Rennes, France

Department
Institut du Management

Position
PhD student

CORRESPONDING AUTHOR

Girault, Anne

EA 7348 MOS-EHESP, Villejuif, France
Author ID: 56556367800
Other name formats:
Subject area: Medicine | Biochemistry, Genetics and Molecular Biology

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KEYWORDS

- Telemedicine
- Online systems
- e-Health
- Health information technology

INTRODUCTION

- Today, a number of important changes are altering cancer care delivery.
- Clinical advances have improved the **survival rates** for most cancers, leading health professionals to treat cancer as a chronic disease.
- With oral therapies, more cancer patients, even during active treatment, can also be cared for from **home**.
- These changes could **save costs**.

INTRODUCTION

- Internet-based technologies (IBT) such as patient portals, websites and applications, managed by healthcare institutions, have therefore been recognised as a significant lever to improve cancer care coordination practices.
- In light of this, IBT can bring valuable opportunities to improve cancer care coordination:

➢ **enhancing patient-provider communication**

➢ **monitoring adverse events**

➢ **providing better patient follow-up at distance.**

INTRODUCTION

- However, more evidence is needed regarding cancer patient's current use and willingness to use IBT to monitor their health.
- First, it is important to know more about their **physical connectivity to Internet**.

EU28 (European Union)		
	2007	2013
Access to the internet	55 %	79 %
Internet connection	42 %	76 %

- Nevertheless, cancer patients can have specific characteristics compared to the general population, especially as cancer patients tend to be older.

INTRODUCTION

- Secondly, it is required to understand the **attitudes** regarding computers, internet and applications as they may play an important role in the willingness to use them for their health.

INTRODUCTION

- Thirdly, the question of the **influence of social inequalities** has to be addressed.
- In the literature, the most frequent **socio-demographic** factors found to be predictors of IBT use were:

- **age**
- **education**
- **socioeconomic status**
- **gender**
- **place of living** and **social isolation**.

INTRODUCTION

SCOPE OF THE STUDY

- Based on a patient survey, the **three objectives** of the study were:

I. To understand the **current level of use of IBT** (computers, tablets, mobile phones and smartphones).

II. To assess the **intention to use IBT** for their health.

III. To determine what **socio-demographic criteria** could be predictors of the **use** and **willingness** to use new IBT in healthcare.

METHOD

- **A questionnaire-based survey**
- **June 2013**
- **Gustave Roussy** (Gustave Roussy is the largest comprehensive cancer centre in Europe, and is located in the suburbs of Paris. The hospital cares for about 50,000 cancer patients annually.)
- **seven outpatient departments** (medical oncology for prostate, breast, skin, head and neck, endocrine, gastric and cervical cancers, radiotherapy, radiology, anaesthesia, haematology).

METHOD

QUESTIONNAIRE DESIGN

- The questionnaire was built upon a preliminary literature review conducted between **January and June 2013** on **Google Scholare**, **Web of Knowledgee** and **PubMede**.
- The questionnaire consisted of **a total of 38 multiple-choice questions** and **one open question**.

METHOD

QUESTIONNAIRE DESIGN

- The questionnaire comprised three parts:

(i) **Use of internet** through computers, mobile phones and tablets

(ii) **Willingness** to use information technologies for their health

(iii) **Socio-demographics**.

METHOD

QUESTIONNAIRE DESIGN

- To investigate whether different groups within the population had different **patterns of use**, we selected **five socio-demographic variables** including:

- **age**
- **gender**
- **socioeconomic status** (based on employment status)
- **number of people in the household**
- **Type of locality they live in** (rural/urban).

METHOD

QUESTIONNAIRE DESIGN

- **Intention to use IBT** for different services in health was measured using a **5-point Likert** scale ranging from **1 (definitely not useful) to 5 (definitely useful).**

- The services were:

- provision of information about disease and treatment
- provision of information about care and support
- peer communication in support groups
- patient-provider communication by e-consultation
- symptom monitoring

METHOD

QUESTIONNAIRE DESIGN

- To ensure **validity** in this method, we tested the questionnaire through **face validity**, using two complementary approaches.
- First, we gathered a panel of **experts** (two physicians, two pharmacists, two nurses and two senior researchers) to evaluate the questionnaire. Following their suggestions, minor modifications were made.
- Second, content validity was then checked by passing the questionnaire to a group of **patients** (n = 20) within Gustave Roussy to ensure the questions were relevant and properly answered by patients.
- Eventually, the final draft of the questionnaire was reviewed in consultation with a **statistician** to ensure that the questions could be coded appropriately for data analysis.

METHOD

DATA COLLECTION

- Patients over the age of 18
- Patients were willing to complete
- Consent
- Anonymous
- The questionnaire was distributed between 6th June and 14th June, 2013, during seven non-consecutive days.

METHOD

ANALYSIS

- Survey data were analysed with an **optical scanner**.
- Statistical analyses were performed using **R**.
- Results were considered significant at $\alpha = 0.01$.
- The first computed **descriptive statistics** based on survey responses.
- Then, an analysis based on **spearman coefficients** and **Fisher's exact tests** was conducted to investigate **correlations** between characteristics of patients' IBT usage and attitudes, and their age, gender, socioeconomic status, social isolation (number of people in the household) and place of living (urban/rural).

METHOD

- For the multivariate analysis, **multinomial logistic regressions** were done including **socioeconomic status** and **age** as independent variables.
- The outcome variables for the **first set of regressions** were 'frequency of use of mobile phone', 'frequency of use of smartphone' and 'frequency of use of computer'. The outcome variable of the **last regression** was the perceived ease of use of IT devices by patients ('I feel able to use a computer, a smartphone or a tablet').
- **Likelihood ratio tests** were conducted to ensure for the goodness of fit of the models.

RESULTS

The participation level was 85%.

Questionnaires with more than five missing answers were excluded from the survey.

Finally, 1072 questionnaires were selected (final response rate = 67%).

RESULTS

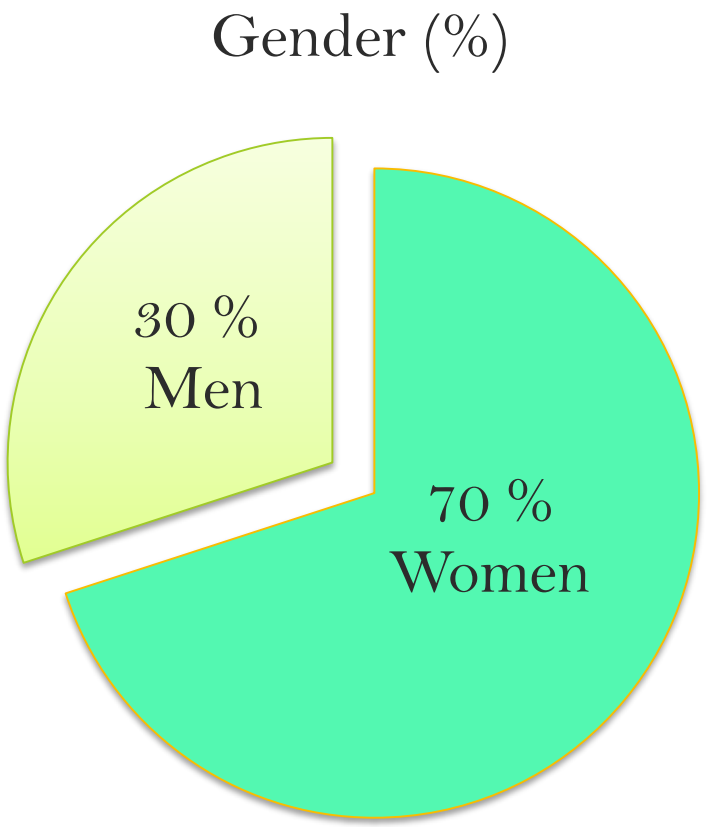


Table 1
Description of respondents.

Characteristics	Participants
Age	53.37
Gender (% women)	
Women	70%
Men	30%
# of people in the household (%)	
1	16%
2	36%
3 et +	47%
n/a	1%
Professional categories (%)	
Retired	26.4%
Manager	22.2%
Worker	21.8%
Unemployed	7.4%
Other	13.6%
n/a	4.3%
Localisation (%)	
Urban	78%
Rural	18%
n/a	4%

Median of average

max

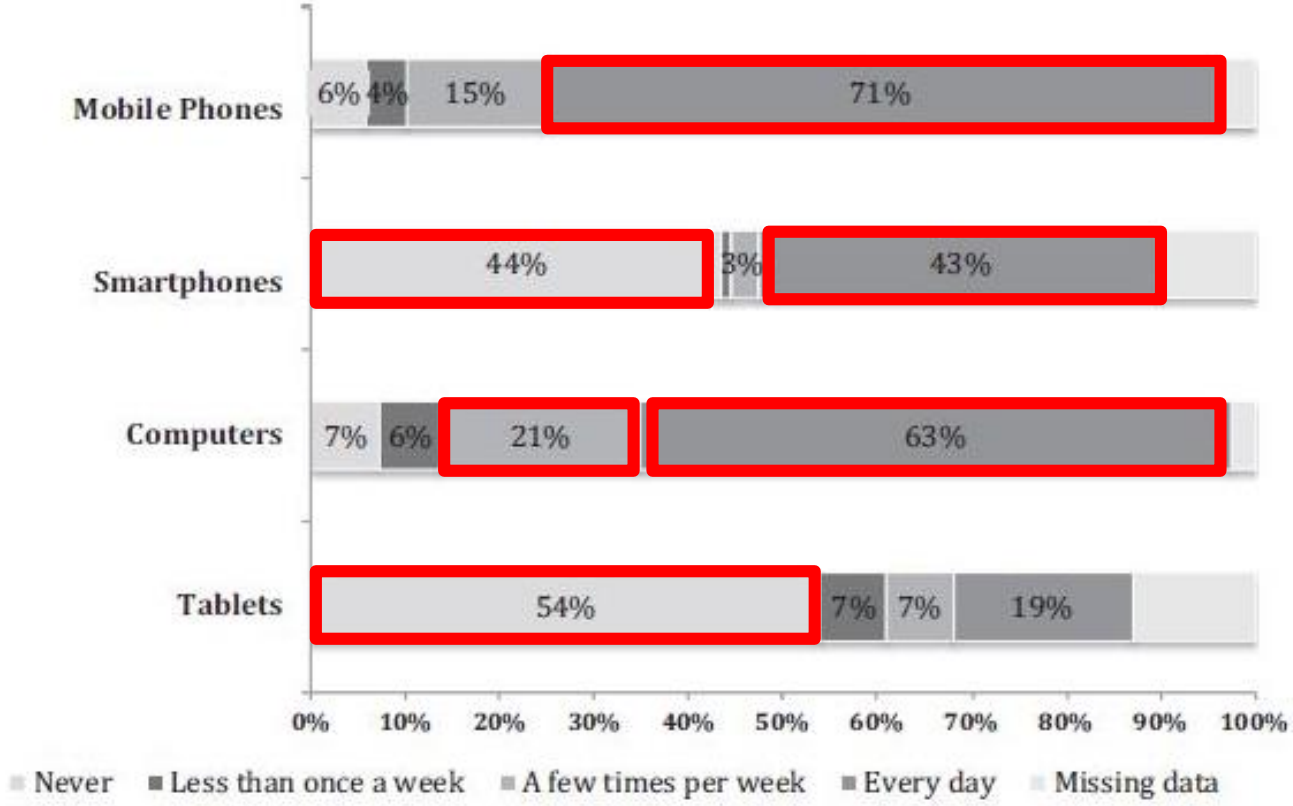
max

max

max

RESULTS

- **93%** of our diverse population accessed the Internet from **home**.
- Among them, **68%** used Internet **every day.**
- Only **7%** of them **did not** have access at **home**.



	Never	Less than once a week	A few times per week	Every Day	Missing data
Tablets	54,00%	7,00%	7,00%	19,00%	13,00%
Computers	7,28%	6,44%	21,18%	62,50%	2,61%
Smartphones	44,00%	1,00%	3,00%	43,00%	10,00%
Mobile phones	5,88%	4,29%	14,55%	71,18%	4,10%

INFLUENCE OF SOCIO-DEMOGRAPHICS

- Age and employment status were significantly associated with the frequency of use of mobile phones, smartphones and computers ($p < 0.05$).
- The respective **correlation coefficients** were **negative** and **moderate** (coefficients between 0.25 and 0.49).
- Age and employment status were then included in the **logistic models**.

Age and employment status were predictors of the frequency of use of mobile phones, smartphones and computers.

Table 2
Coefficients of the multinomial logistic regression on frequency of use.

Applications	Frequency of use of a mobile phone		Frequency of use of a smartphone		Frequency of use of a computer	
	Every day versus less than once/wk	A few times/wk versus less than once/wk	Every day versus less than once/wk	A few times/wk versus less than once/wk	Every day versus less than once/wk	A few times/wk versus less than once/wk
Age	−0.05**	−0.02	−0.05**	−0.05**	−0.02	−0.03
Employment						
Manager	1	1	1	1	1	1
Worker	−0.2	−0.23	−0.75*	−0.46	−1.45**	0.66
Retired	−1.14*	0.3	−1.25**	0.003	−1.49**	−1.12*
Unemployed	0.2	0.9	−0.81*	−0.003	−1.25*	−0.78

* <0.01.
** <0.001.

5% decrease

5% decrease

68% decrease

77% decrease

71% decrease

INTENTION TO USE IBT FOR HEALTH CARE

Table 3
Perceived usefulness of internet-based technologies (IBT) applications.

IT applications	Useful/very useful (%)	Neutral (%)	Not useful/rather not useful (%)	n/a (%)
Have access to electronic medical records	80	4	15	1
Fill out a self-test about your health status	78	5	17	0
Communicate via emails with your physician	75	5	18	2
Schedule an appointment	71	6	22	1
Get information about disease/support	69	12	18	1
Get access to external contacts (psychologist, nurses, ...)	66	13	20	1
Get help with medication monitoring (reminders, side-effects)	61	12	26	1
Give access to a relative for using these functions	48	14	37	1
Receive a reminder for the appointment	44	35	20	1
Chat with peer patients	44	23	31	2
Communicate via video	36	18	44	2

max

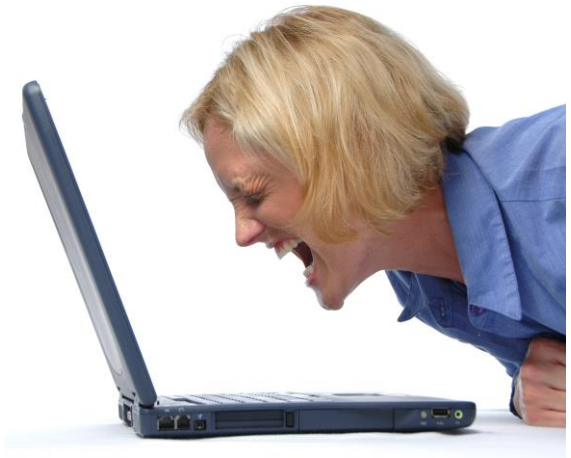
Not useful by a majority of respondents

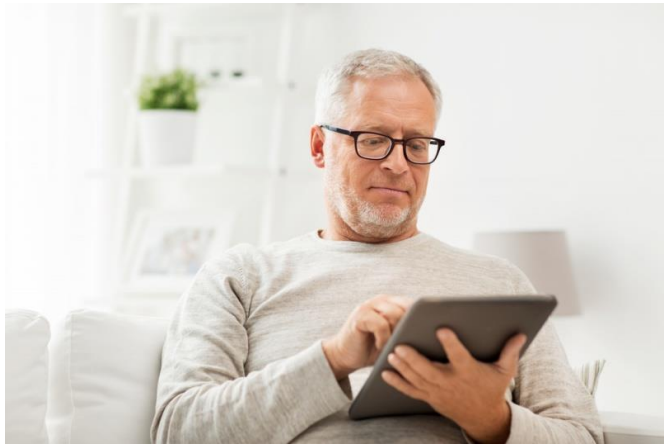
chat with peer patients was not important for them

RESULT

PERCEIVED EASE OF USE

- **84%** of the population studied declared to be **able to use** a computer, a tablet or a smartphone.
- Only **8%** disagreed.





RESULT

PERCEIVED EASE OF USE
INFLUENCE OF SOCIO-DEMOGRAPHICS

- Age and employment status were significantly associated with the perceived ease of use of mobile phones, smartphones and tablets ($p < 0.05$).
- The respective **correlation coefficients** were **negative** and **moderate** (coefficients between 0.25 and 0.49).
- Age and employment status were then included in the logistic models.

As shown in Table 4, Perceptions regarding the ability to use IBT devices were **negatively** associated with age and employment status.

Table 4
Coefficients of the multinomial logistic regression on perceived ease of use.

Applications	I am able to use a computer, a tablet or a smartphone	
	Agree versus disagree	Neutral versus disagree
Age	−0.07**	−0.03
Employment		
Manager	1	1
Worker	−1.43*	0.33
Retired	−1.37*	0.27
Unemployed	−1.7*	0.28

* <0.01.
** <0.001.

7% decrease

76% decrease

75% decrease

82% decrease

RESULT

PERCEIVED EASE OF USE
INFLUENCE OF SOCIO-DEMOGRAPHICS

- Overall, a **majority** of the patients included in our study sample were willing to use IBT for their health care.
- Except that, the only issue raised by respondents was the question of **data confidentiality**.
- **A third** of the population (***32%***) reported being **worried** about this matter.

DISCUSSION

- The **first findings** indicated that **access** and **use** of IBT were widespread in the population.
- These proportions align with the projections that had been made for developed countries.
- It is estimated that there were **six billion mobile phones** in 2013, with over **85%** of the world's population having **access to a mobile signal**.
- It is less evident for **tablets and smartphones** (46%) which are still used by a minority, even if the figures could change **rapidly** (e.g. the proportion of people owning a smartphone has **doubled** between 2012 and 2013 in the general population in France)

DISCUSSION

- The **second findings** were related to patient **willingness** to use IBT for their health.
- **80%** of respondents considered the possibility to get an improved **access to their medical records** as a priority. It is something observed for other clinical conditions over the last decade [20], yet far **fewer (7%)** had experience doing so [21].
- We can highlight that **chatting with peer patients** was not necessary according to most patients **(54%)** even if some blogs have been developed with success over the last decade.

DISCUSSION

- The **third findings** were related to the **influence of age and socioeconomic status** in both **access** to and **perceived ease of use** of IBT.
- This measure of influence should be considered in a **dynamic** way (for instance, the percentage of social network users aged fifty-five to sixty-four rose from **9** percent at the end of 2008 to **43** percent by mid-2010).

DISCUSSION

CHALLENGES

- Implementation of such IBT required health care organizations to comply with standards to ensure patients a sufficient level of **privacy** and **security** when using internet-based technologies.
- This study shows that **older patients** are **less likely to use** web-based tools. As old patients are also less likely to search for information about their cancer [25], **customization** is necessary in order to adapt IBT to their **specific needs**.
- Last, the increase in the use of IBT can alter the **doctor- patient relationship**. (**Face to Face contact**)

DISCUSSION

PERSPECTIVES

- IBT at the **hospital** level:
  - **Enhancing coordination between professionals**
  - **Improve quality of care**
  - **Save costs**
  - **Reduce mails, telephone communications and missed appointments**
  - **Reduce time.**

DISCUSSION

PERSPECTIVES

- IBT at the **patient** level:

- **Reduce outpatient visits**
- **Monitor adverse events associated with chemotherapies**
- **Maintaining contact with the clinical team**
- **Providing useful information to the patients**
- **Medication refills**
- **Appointment scheduling**
- **Access to general medical information.**

DISCUSSION

PERSPECTIVES

- Last, IBTs could also be used to facilitate **real-time data collection** of patients' health status and they can provide useful information to health professionals.

DISCUSSION

LIMITATIONS

- Limitations of this study include its **sampling from a single centre** in a metropolitan area, so the results may have limited generalizability.

DISCUSSION

CONCLUSION

- As patients are **open to use** them, IBT could play a significant role in cancer care coordination in the **near future**.
- This study confirmed a **majority** of the cancer patients were **willing to use** Internet-based technologies for their health care.
- The effects of age and socioeconomic status have to be addressed.
- This study shows that **older patients** are **less likely to use** web-based tools.

Thanks for Your Attention

Health Information Technology Department
Mashhad University of Medical Sciences

Alireza Banaye Yazdipour

Email Address: bannaya961@mums.ac.ir