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Design, Development and Implementation of a Touch-Screen Health Information Kiosk for Patients at the Outpatient Waiting Area in a Large Tertiary Care Hospital in India: An Evaluation of User Satisfaction

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Abstract. This study elicits patient feedback post-accessing a health information kiosk conceptualized, designed and developed by St. John's Research Institute and deployed in the outpatient waiting area of the 1250 bedded St. John's Medical College Hospital, Bangalore for its ease of use, appropriateness and usefulness and ability to provide reliable, evidence-based health information. One hundred and fifty four randomly selected patients who accessed the kiosk, christened the '*iHealth Desk*' in a chosen month took part in exit interviews for this study. Response options were on a scale of 0-9 (9 being the highest) for each parameter being ascertained.

Statistical analysis revealed that 62% of the patients rated the kiosk between 'good' and 'excellent' for overall satisfaction with 'ease of use', 58% of them rated the kiosk between 'good' and 'excellent' for feedback on screen features; 45% of them rated the kiosk between 'good' and 'excellent' for 'availability of health information' on the kiosk and 59% of respondents rated the kiosk for 'adequacy' of health information, 62% rated the kiosk between 'good' and 'excellent' for 'ease of learning the navigational pathway' and 55% rated the 'kiosk capabilities' between 'good' and 'excellent'. Male and female users expressed similar non-significant levels of satisfaction in the different domains of satisfaction ($p>0.05$).

Ease of use, easy navigation, availability of information sought and the adequacy of health information available were found to be important parameters for user satisfaction with the health information kiosk.

Keywords: user satisfaction; health information; touch-screen kiosk; hospital OPD.

I. Introduction

1.1 Background Literature

The use of kiosks in healthcare for patients to collect and deliver health information is growing rapidly. Computer-based health information kiosks are being introduced for providing health information to patients [1]. Health information provision for patients was first attempted by organizations who felt it was an extension of patient services and hence a necessary part of patient care [2]. These initiatives have improved awareness about the availability of health information and informed people about the accessibility of evidence-

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based health information [3]; [4]. Most of these custom-made developments have emerged when the availability of health information is ever-increasing, especially on the internet, although concerns about the quality of health information available to patients have emerged [5]. The unprecedented growth in computer-based communication and the trend of providing patients more freedom on decision-making has effected changes in the delivery of care [6]. There is no doubt that consumers of healthcare will continue to seek health information on their own. A few years ago, it was unthinkable for lay people to look for healthcare information on the internet; however, the increased accessibility to the web has made this possible now [7]; [8]; [9]; [10]. However, there is a perception that inequitable distributions of access to the Internet and computers might tend to widen social disparities in health care access and outcomes [11].

It has been documented that an ever-promising means of providing accurate health information to patients and families who lack internet access is through computer-based health information kiosks which are basically Automatic Teller Machine (ATM)-type terminals with touch screens that do not require technical expertise to navigate [12]; [13]. In planning to deploy a kiosk for community use, it has been shown that many factors such as proper location, presentation, access, and support need to be considered to aid in usage [14]. Kiosks are being considered as economical tools of providing information to patients and to assist patients in managing their condition in between doctor visits. Kiosks have been thought of as tools which help to follow up with patients although some prospective kiosk users may avoid them if they prefer direct communication with their doctor or if they wish to limit their health information inputs [14]. Prior research has approved the use of kiosks among low-literate and low-income populations. It was found that the information on the kiosk was easy to use [15] and more than half of the users (55%) in one study found it easy to use although they all had less than a high-school education [16]. Health information kiosks have been in use across several countries for delivering health content to patients but there is very little published research on user satisfaction [17]; [18]; [19]. Patients have however reported a better understanding of their health condition with access to a health information kiosk [20] and demonstrated increased overall patient knowledge [21]. Kiosks can play a vital role in providing low-cost or completely no-cost, easy to access information with visible information benefits to patients, but the identification of appropriate features that increase the ease and frequency of use have not been researched in detail.

In a relevant study [22], thirty-five people were interviewed about their use of the ‘HealthPoint Kiosk’, and almost all of them had been positive about the system. Only 2 (6%) felt the kiosk was not easy to use, whilst 32 (91%) were in favour of turning the facility into a permanent one. Use was not related to gender, age, type of location, or length of time spent in the waiting room. However, it was found that 63% of respondents used the kiosk just out of curiosity with only 37% of them seeking specific health information. Of the respondents who looked for specific health information, 95% had found the information they were looking for on the kiosk [22]. A number of factors that seem to affect the accessibility of information solutions for the public such as faith in the content (authenticity), ease of use (hardware, navigation and other interface aspects) have been pointed out to be crucial in earlier studies [23]. Other important factors that ensured usage were shown to be – a convenient location at a convenient time and the cost. It has been shown that kiosk location affects usage by the general population. The location need not be a hospital department as patients may be short of time and generally anxious when

visiting their doctor. It was found that being free-to-use was an attraction in itself for the kiosk [24]; [25]; [26]; [27]; [28]; [29]; [30]; [31]; [32].

1.2 Study Aims

It is still a relatively new concept in India to make available health information on a kiosk in a hospital. The service benefit being considered is that patients who have visited a physician and obtained a consult and/or a diagnosis have the option now to read more on the condition with specific information available on signs, symptoms, diagnostic tests, treatment options, etc. and about health in general with sections on preventive health and general health tips. There have been no studies reported on user satisfaction upon accessing a touch-screen health information kiosk in a hospital in India and this lacuna is being addressed through this study. Information kiosks are a recent entry into the healthcare domain in India and the use of them is still in its infancy. Very few healthcare institutions have conceptualized offering health information on a kiosk to their patient population and St. John's Medical College Hospital has been among the foremost in India. The aim of this study was to evaluate user satisfaction on a touch-screen computer-based health information kiosk that had been designed and developed in-house and deployed as a no-fee source of health information. The parameters being evaluated on the kiosk included overall ease of use, the health information itself, and appropriateness and usefulness of the content. This study elicits user satisfaction scores on some of the features of the kiosk such as overall satisfaction with the kiosk and more specifically regarding screen features, health information on the kiosk and adequacy of information, navigation pathway on the kiosk, kiosk capability in terms of response speed, ease of use for experienced and inexperienced computer users and to ascertain whether age or sex had an impact on user satisfaction scores.

II. Methods

2.1 Kiosk Design and Development

A health information kiosk was conceptualized in the early part of 2007 with subsequent incremental brainstorming on the design and features in parallel with in-depth searches to understand the global scenario and current literature on kiosk use across the world. The authors and the informatics team from St. John's Research Institute took the lead in designing a kiosk for patient use. The impetus was to develop a low-cost and easy-to-use touch screen kiosk which would assist patients in accessing reliable health content post-physician appointment in the outpatient waiting area of the hospital. The kiosk was designed in-house and a fabricator was contracted for provision of hardware components and to assemble the unit. The hardware specifications of the kiosk included a processor of Intel core 2 1.8 Ghz, RAM of 1 GB, Hard Disk Drive of 120 GB, and a 17 inch touch-screen monitor. The operating software was Windows XP, SP2.

Once the kiosk frame and the hardware components were assembled, the software application was loaded onto the system. The PHP-based software application was developed through a collaborative software firm which designed, tested and installed the application. There were frequent iterations between the informatics team and the developers to ensure that the interface was 'easy to use' and 'user friendly'. Health content was authored by a group of doctors working in the health informatics unit. This

health content adhered to best practices being followed currently and evidence-based medicine. The content was tailor-made for the Indian population with focus on conditions which commonly affected the population. The content administrator's console was created for uploading content onto the kiosk with quality level checks and edit options at every level. The content administrator was a doctor chosen for editorial skills and patient-literature experience. After adequate testing and piloting on different sections of the patient and physician population, the kiosk, called the '*iHealth Desk*,' was installed in the outpatient waiting area of St. John's Medical College Hospital, Bangalore.

The kiosk presented a simple user interface for the patient. The home page had 4 sections:

1. Spotlight: This section presented topics of recent importance in the area of health such as commemorative dates for specific health events or an epidemic outbreak, alerts and reminders.
2. News: This section presented recent updates in the field of health and medicine
3. Health Information: This section housed the set of health information factsheets which were listed in alphabetical (A-Z) as well as under specific disease-condition names.
4. Events: This section primarily provided information on health events being conducted in the tertiary care hospital – the 1250 bedded St. John's Medical College Hospital, Bangalore.

After a couple of months of the kiosk being installed, it was noted that there were on an average 23-24 patients accessing the kiosk each day. In a cross-sectional study design, every third patient who accessed the health information kiosk in a chosen month was included in the study and the validated questionnaire was administered to them. Ethical approval had been obtained from the Institutional Ethics Review Board (IERB) at St. John's Medical College. The questionnaire consisted of 18 Likert-scale pattern questions (for example: "the use of colour on the screen" was terrible/excellent). These were followed by two free-text questions to elicit user comments on what topics would they require health information on and to solicit suggestions to improve the kiosk experience. The questionnaire was piloted and pre-tested by conducting 50 interviews to obtain validity. A total of 154 randomly selected patients who accessed the health information kiosk in the outpatient waiting area in the chosen month were interviewed. A 9-point scale was developed and defined as follows: 0 – Terrible, 1 – Unacceptable, 2 – Very Poor, 3 – Poor, 4 – Below expectations, 5 – Average, 6 – Fair, 7 – Good, 8 – Very Good, and 9 – Excellent. Response ratings in the range of 7 to 9 (Good, Very Good and Excellent) were grouped together as they reflected positive scores for kiosk satisfaction and this aggregate value was expressed as a percentage. Respondents were grouped into age-groups following the mean and by gender in order to analyse group-specific responses.

Patient respondents were told about the study and informed consent was obtained by the kiosk educator who stood by the kiosk to assist new kiosk users. Patients were asked to fill out the questionnaire when it was least obtrusive and when they were not pre-occupied in the hospital. One hundred and fifty four randomly selected patients from the selected month who had accessed the *iHealth Desk* took part in exit interviews for this pilot study over a period of 1 month. The criteria for inclusion were: (a) willingness and written consent to participate, (b) patients who had consulted a doctor in the outpatient

department of the hospital and (c) patients who were 18 years or above in age. Physicians regularly advised patients to make use of the kiosk for obtaining health information after their outpatient physician consultation. Interviews were conducted for consenting patients by the kiosk educator, a doctor (health informatics professionals engaged in research work who were not practicing in the hospital; also dressed in non-medical attire), who was posted at the kiosk to assist patients with navigational help if required. Every respondent had to answer all five sections which related to – overall satisfaction with the kiosk, screen features, health information, navigational ease, and kiosk capabilities. For all these parameters, the patient had to rate his or her satisfaction on a tested scale of 0-9, '0' denoting the 'least satisfying' and '9' for the 'highest satisfaction' based on the individual user experience.

The 'kiosk educator' posted at the kiosk would assist the patient if they sought help in accessing the kiosk. The user could touch-click the on-screen icons related to the medical specialty he or she wished to access and read about. Health topics could be found under the relevant specialty icon or under the alphabetical (A-Z) listing of topics on the kiosk homescreen. Once a particular specialty icon was touch-clicked, it led to a listing of all content or topics available under that specialty header. The patient could view all available topics on screen and touch-click on the topic of interest for reading. There were 'forward' arrow buttons and 'backward' arrow buttons for 'next' and 'previous' options. The patient was free to use the kiosk for any length in time and only after he/she finished would the kiosk educator approach the patient with the questionnaire.

Brief demographic information and contact details of the patient were gathered in the questionnaire. Patients then answered questions under the 5 sections which related to actual user experience on the kiosk. The questionnaires were checked for completeness and responses entered on an MS Excel spreadsheet (Office 2007). Double data entry was done and quality checks were accomplished.

III. Results

3.1 Statistical Analysis

Individual scores were described using median and quartiles. Cumulative scores were compared between males and females using the independent samples 't' test. Scores were compared between age groups using the 'analysis of variance'. These scores were separately assessed within males and females. In order to find out if there was a statistically significant difference in mean responses between age groups, the 'ANOVA' was performed. In order to explain if any statistical difference existed for the responses between gender, the Independent samples 't' test was used. All statistics analyses were performed using SPSS V 18.0 (SPSS Inc. Chicago, Ill) and $p>0.05$ was considered statistically significant.

Table 1 provides details of respondent demographics by age and gender. Table 2 shows the scoring scale which was developed, tested and used for rating satisfaction. Table 3 lists out the questions for each of the five parameters that evaluated: 'overall satisfaction', 'screen features', 'health information', 'navigational ease' and 'kiosk

capabilities'. The percentage of responses scored between 7-9 points (Good, Very Good and Excellent ratings) of the scale are also indicated.

Table 1: Composition of the Respondents by Age and Gender	
Age Groups	**Number and Percentage of Respondents**
18-35 years	93 (60.38%)
36-45 years	34 (22.07%)
46-55 years	16 (10.38%)
56 years and above	11 (07.14%)
Gender	**Number and Percentage of Respondents**
Female	44 (28.57%)
Male	110 (71.43%)

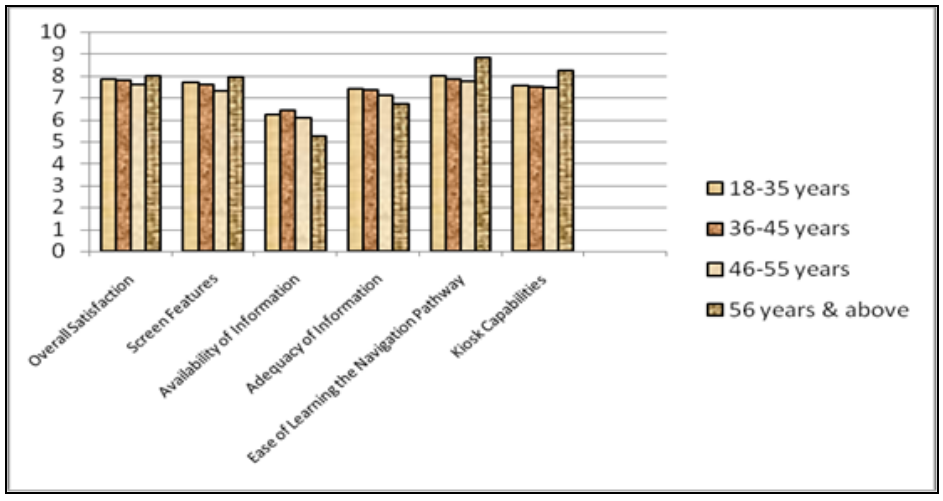
Table 2: The 9-point scale which was developed and employed	
Score	**Meaning**
0	Terrible
1	Unacceptable
2	Very Poor
3	Poor
4	Below Average
5	Average
6	Fair
7	Good
8	Very Good
9	Excellent

Table 3: Lists out the cumulative percentage of scores obtained between 7-9 of the scale using medians and quartiles for each parameter		
Parameter	**Response reference range and score obtained (0-9)**	**Percentage of responses obtained between 7-9 of the scale (Good to Excellent)**
Overall Satisfaction with Ease of Use	*Terrible~Wonderful* - Median (Q1, Q3) = 8.00	59.74%
	Frustrating~Satisfying - Median (Q1, Q3) = 8.00	60.38%
	Dull~Stimulating - Median (Q1, Q3) = 8.00	59.09%
	Difficult~Easy - Median (Q1, Q3) = 8.50	64.28%
	Not Useful~Very Informative - Median (Q1, Q3) = 9.00	65.58%
Screen Features	*Use of Colour: Poor~Excellent* - Median (Q1, Q3) = 8.00	62.98%
	Screen Layout is Easy: Never~Always - Median (Q1, Q3) = 8.00	57.14%
	Amount of Information: Inadequate~Adequate - Median (Q1, Q3) = 8.00	51.29%
	Arrangement of Information: Illogical~logical - Median (Q1, Q3) = 8.00	59.09%
	Screen Icons/Tabs easy to use: Not at all~Very Convenient - Median (Q1, Q3) = 8.00	61.68%

Health Information	*Unavailable~Available* - Median (Q1, Q3) = 7.00	44.80%
	Inadequate~Adequate - Median (Q1, Q3) = 8.00	59.09%
Ease of Navigation	*Learning to use: Difficult~Easy* - Median (Q1, Q3) = 9.00	68.18%
	Getting started: Difficult~Easy - Median (Q1, Q3) = 8.00	62.33%
	Navigation pathway: Difficult~Easy - Median (Q1, Q3) = 8.00	62.98%
	Exploration of features: Discouraging~Encouraging - Median (Q1, Q3) = 8.00	53.89%
Kiosk Capabilities	*System speed: Too Slow~Fast Enough* - Median (Q1, Q3) = 8.00	60.38%
	Useful for experienced and inexperienced users: Never~Always- Median (Q1, Q3) = 8.00	50%

Demographic details of the 154 user-respondents are provided in Figure 1. There were 110 males and 44 females among the user-respondents. The mean age of the respondents was 35.08 years. Respondents were grouped into the following age groups: 18-35 years (93 users), 36-45 years (34 users), 46-55 (16 users), 56 years and above (11 users). In terms of 'overall satisfaction' – 59.74% of users had rated the kiosk between 7 and 9 which represented 'good' to 'excellent', 60.38% of users had rated the kiosk between 7 and 9 with 0 standing for 'frustrating' and 9 for 'satisfying', 59.09%% of users had rated the kiosk between 7 and 9 with 0 standing for 'dull' and 9 for 'stimulating', 64.28% of users had rated the kiosk between 7 and 9 with 0 standing for 'difficult' and 9 for 'easy' and 65.58% of users had rated the kiosk between 7 and 9 with 0 standing for 'not useful' and 9 for 'very informative'.

Figure 1: User satisfaction on the Touch Screen Kiosk by Age-Groups



For 'screen features' – 62.98% of users rated the kiosk between 7 and 9 for the 'use of colour on the screen' with 0 standing for 'poor' and 9 for 'excellent'; 57.14% of users had rated the kiosk between 7 and 9 for 'screen layout makes tasks easier' with 0 standing

for ‘never’ and 9 standing for ‘always’; on the ‘amount of information on the screen’ – 51.29% of users rated the kiosk between 7 and 9 with 0 standing for ‘inadequate’ and 9 for ‘adequate’; on ‘arrangement of information on the screen’ – 59.09% of users rated the kiosk between 7 and 9 with 0 signifying ‘illogical’ to 9 standing for ‘logical’; 61.68% of users had rated the kiosk between 7 and 9 in answering whether ‘screen icons and tabs were easy to comprehend, access and use’ with 0 standing for ‘not at all’ and 9 denoting ‘very convenient’.

On the ‘health information’ available on the kiosk: 44.80% of users rated the kiosk between 7 and 9 for availability of health information that they sought with 0 denoting ‘unavailable’ and 9 denoting ‘available’; 59.09% of users rated the kiosk between 7 and 9 for the adequacy of health information with 0 standing for ‘inadequate’ and 9 for ‘adequate’.

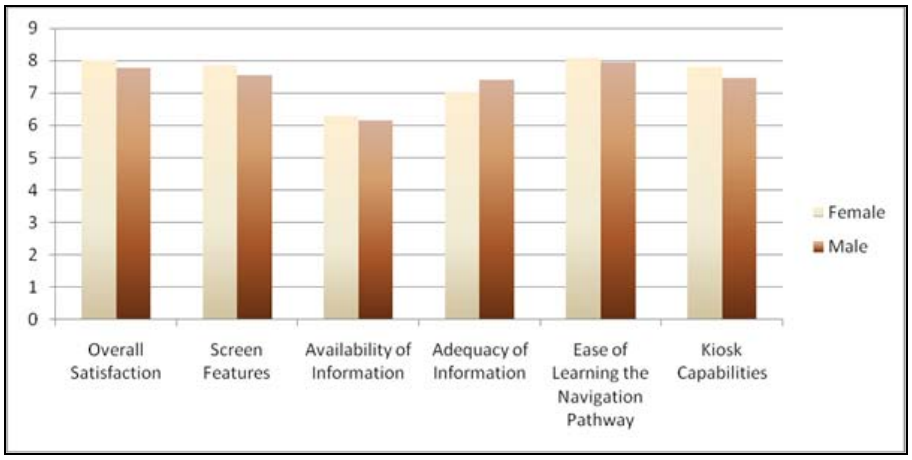


Figure 2: User satisfaction on the Touch Screen Kiosk by Gender

Regarding ease of navigation and learning required for the same: 68.68% of users had rated the kiosk between 7 and 9 on whether ‘learning to use the touch screen kiosk was difficult or easy with 0 standing for ‘difficult’ and 9 for ‘easy’’; 62.33% of users rated the kiosk between 7 and 9 on whether getting started on the touch screen kiosk was difficult or easy with 0 denoting ‘difficult’ and 9 for ‘easy’; 62.98% of users rated the kiosk between 7 and 9 on whether learning the navigation pathway was difficult or easy with 1 standing for ‘difficult’ and 9 for ‘easy’; and 53.89% of users rated the kiosk between 7 and 9 on whether exploration of features by trial and error was discouraging (rated 0) or encouraging (rated 9).

With regard to Kiosk Capabilities; 60.38% of users rated the kiosk between 7 and 9 on whether the general system speed was too slow (rated 0) or fast enough (rated 9) and 50% of users rated the kiosk between 7 and 9 on whether it was useful for experienced as well as inexperienced users between ‘never’ (rated 0) or ‘always’ (rated 9).

The individual scores were summed and explained using medians and quartiles as shown in Table 3. Figure 1 shows the aggregate user satisfaction scores for various age groups. The mean responses between the age groups were not statistically significant

when examined using the ANOVA. Male and female users (Table 4) expressed similar non-significant levels of satisfaction for the different parameters of satisfaction being evaluated ($p>0.05$).

Table 4: Mean and Standard Deviations for each of the Study Parameters by Gender

N = 154 Males = 110 Females = 44 GENDER		SECTIONAL QUESTIONS	PARAMETER	MEAN	STD. DEVIATION
1.	Males	Q1 TO Q5	Overall Satisfaction	38.8	4.2
	Females			40.0	4.4
2.	Males	Q6 TO Q10	Screen Features	37.7	4.8
	Females			39.3	4.5
3.	Males	Q11 TO Q12	Availability and Adequacy of Information	13.5	3.4
	Females			13.3	3.2
4.	Males	Q13 TO Q16	Ease of Learning the Navigation Pathway	62.8	6.4
	Females			64.4	6.1
5.	Males	Q17 TO Q18	Kiosk Capabilities	14.9	2.6
	Females			15.5	2.2

IV. Discussions

The study finds that a larger proportion of respondents had stated that the information provided was relevant to their needs, available and adequate. These findings corroborate with similar results in the study published by Jones, R. et al (1990) [22], where thirty-five people had been interviewed on their use of the kiosk, and almost all of them were positive about the system. One of the important findings was regarding the 'health information' available on the kiosk. In the study by Jones, R et al (1993) [31], it had been found that 95% of users had found the information they were looking for. In this study, it was found that only 44.80% of the users had found the specific health information that they were looking for. This could probably be explained by the fact that at that point in time when the study was being conducted there were only 150 health topics on the kiosk and hence not all patients would have found what they were looking for. This was taken note of and the kiosk is, as of date, populated with a lot more content; around 480 health topics. It would be interesting to conduct another study at this juncture. The responses and suggestions obtained for the two free-text questions which elicited user comments on what topics would they need information on and soliciting suggestions to improve the kiosk experience were grouped and coded. A majority of the users had expressed the desire to read more topics in relation to communicable diseases, health and hygiene and nutrition related disorders. It is important to note that only 59.09% of the users had felt there was 'adequate information' on a health topic they read about on the kiosk.

The touch-screen kiosk was located in the outpatient department of the hospital and hence in a very convenient access area for patients waiting their turn with the physician or for those after completion of their consultation. Accessing the kiosk was free of charge

and the kiosk educator clarified this to the patients; patients welcomed this free-to-use service and were keen to use the kiosk. These findings support what has been documented in previous published work: convenient location at a convenient time and cost; it was also found that being free-to-use was an attraction in itself for the kiosk [24]; [31].

In the study by Patyk M. et al (1998) [32] which looked at the accessibility of two similar touch-screen computer systems for patients having cancer- use, repeat use and ease of use of the kiosk were reported and compared to demographic characteristics, level of anxiety, prior computer experience, attitudes and information need as expressed by the patients themselves. Participants' post-use opinions were sought on the kiosk's ease of use, and the relevance and utility of the information. Nineteen percent of participants had stated that using the computer made them feel a little anxious, but 50% of them had been looking forward to it, and 32% were neither particularly interested nor anxious. In this study, we have seen that 61.81% of patients had rated the kiosk between 'good' and 'excellent' with respect to overall satisfaction and 58.44% of them rated the kiosk between 'good' and 'excellent' for feedback on screen features. 68.18% of users have indicated that learning to use the touch screen kiosk was easy and 62.33% of users have rated the kiosk between 'good" and 'excellent' for ease of getting started on the touch screen kiosk. Also, 62.98% of users have rated the kiosk between 'good' and 'excellent' for ease of learning the navigational pathway. In the study by Patyk et al - fifty-five per cent had never used a computer before and of those who had (39%) had only used one a few times. It was discussed there that the information needs overshadowed competence in computers or familiarity with technology. Seventy-eight per cent had found using the computer easy or very easy, indicating that good IT skills may not really be required. These findings differ from results on this study wherein only 53.89% of users rated the kiosk between 'good' and 'excellent' for being encouraged to explore the features of the kiosk by trial and error; 50% of users rated the kiosk between 'good' and 'excellent' for whether it was easy to use and useful for inexperienced users; those being computer literate and having access to computers would probably have scored higher here. It is worth stating that while we expected users to be intimidated by the presentation of a kiosk, actual users reported of no difficulty in utilizing them. It is also true that what appears easy for a new user will be different for a regular computer user. The study also emphasises the importance of providing relevant health information so that the content is appropriate and absorbed by the patients.

There was no statistically significant difference in user satisfaction between age groups or between gender. The study also subtly reinforces that it was quite beneficial to the patient to have a 'kiosk educator' available at hand who could advise, relate to the patient and assist those who had any difficulty in navigation or required help in locating a particular health topic on the kiosk. It was understood that for such an intervention to be successful and to sustain, staff interest and commitment is the key. Kiosk educators were motivated to lead this effort, the time spent was accommodated in their regular job routine and they were instrumental in making sure the patient community braces up to the kiosk without any reservations. In the absence of mainstreaming this kind of effort as part of hospital routine, it becomes difficult to sustain this intervention.

V. Conclusions

This study encourages us to believe that computer-based touch-screen health information kiosks can be a viable tool for providing health information to patients visiting a hospital after a physician consultation provided reliable health information is available and in adequate measure to satisfy the information needs of the patient community. This method of dissemination of health content was found to be relatively cost-effective, useful and appropriate as seen from the study. While this study did not include a substantially large number of respondents, the ratings clearly support the provision of touch screen health information kiosks to help address health information needs of patients and others. This entire effort bore fruit from intramural funds and relied heavily on the commitment of the investigators and the volunteers; hence, there were constraints in funding and with respect to allocation of time; however, this study informs that with sustained efforts and vision, such interventions can be thought of and implemented with the objective being to inform and educate the patient community.

Going forward, it would be of relevance to study the specific information needs of patients who are diagnosed with various ailments and how kiosks can be used along with other means of information dissemination to provide them reliable health information. Delivery of appropriate health content based on user-characteristics is also possible through analytics which can be built into the application; demographic details of the patient can be captured at each instance to aid in customised provision of options. Evaluating the impact of health information obtained from a kiosk and its effect on behaviour change or actual health outcomes can serve as a nidus for further research in this space. A cost-benefit introspection into the service provided and the estimated preventive health outcomes achieved is also a possible research focus to be pursued.

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