

The provision of prostate cancer patient information leaflets on an electronic tablet: A further step to paperless health-care provision

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Abstract

Introduction: The provision of patient information leaflets (PILs) for cancer treatment options is primarily via a paper format. PILs can now be provided on an electronic tablet with the added benefits of providing audio-visual information.

Materials and Methods: Between February 2017 and August 2019, 112 patients with newly diagnosed prostate cancer (PCa) were enrolled into our prospective cohort study. The control group ($n = 56$) were all given PILs on a paper as the standard of care (SoC). The intervention (tablet) group ($n = 56$) were given the same paper PILs as that of the control group plus an electronic tablet computer with an application containing all SoC paper PILs in an electronic format and supplementary videos detailing treatments. Both groups were asked to complete a validated questionnaire (Telemedicine, Satisfaction and Usefulness questionnaire) with regard to satisfaction with care, provided information, and tablet usage.

Results: The response rate for our study was 78/112 (70%). The control and tablet groups were highly satisfied with their care (91%–100% agreed or strongly agreed) and with the information they received (80%–100% agreed or strongly agreed). In the tablet group, 41/46 (89%) reported its utilization. Of those 41, 38 (92%) considered the tablet easy to use and 13 (32%) reported a preference for the paper format.

Conclusions: The provision of electronic PILs in PCa treatment is an innovative method of providing oncological care, with positive feedback from our patients. With further development as a mobile application, electronic PILs may allow a more environmentally and fiscally advantageous method of providing PCa care.

Keywords: Electronic tablet, environment, patient information leaflets, telemedicine

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Received: 30.10.2020, **Accepted:** 05.01.2021, **Published:** 15.02.2022.

Access this article online	
Quick Response Code:	Website: www.urologyannals.com
	DOI: 10.4103/UA.UA_174_20

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How to cite this article: Miah S, Maw J, Pang K, Nair V, Hori S, Lamb A, *et al.* The provision of prostate cancer patient information leaflets on an electronic tablet: A further step to paperless health-care provision. *Urol Ann* 2022;14:156-61.

INTRODUCTION

Patient information leaflets (PILs) have been shown to benefit their readers including improvement of their post clinical consultation recall.^[1] More specifically, the provision of PILs for those with a diagnosis of cancer has demonstrated positive effects on numerous patient-related outcome measurements (PROMs) including knowledge and recall, symptom management, satisfaction, preferences, health-care utilization, and affective states.^[2]

The primary medium used for the provision of PILs remains on a paper-based format. However, with the emerging and cost-competitive technologies, these can now be provided on an electronic tablet with the added benefits of potential audio-visual information to be given to patients regarding their cancer care.

It has been estimated that 1.2 million new cases of prostate cancer (PCa) were diagnosed in 2018 worldwide.^[3] The curative treatment of PCa includes radical surgery, external beam radiotherapy in combination with hormonal therapy, brachytherapy, and focal therapy with their various energy sources and active surveillance. Often, many of these treatments have similar oncological outcomes.^[4,5] However, each have their distinct morbidity, functional outcomes, and treatment lengths. This has shown to cause information overload for those men diagnosed with PCa and required to make an informed decision on their treatment choice.^[6]

Here, we report on the feasibility, utilization, and patient satisfaction in providing PILs on an electronic tablet in men newly diagnosed with PCa. We also report on the potential added environmental benefits in adopting paperless health-care provision for patients.

MATERIALS AND METHODS

Participants

Between February 2017 and August 2019, 112 patients with newly diagnosed with PCa and suitable for >1 curative treatment modality were enrolled into the study. The intervention (tablet) group patients were selected in a consecutive manner which was dependent on the availability of the device. The control group was selected in a consecutive manner. We recruited 56 men for each group.

The tablet group patients were all given paper PILs as part of standard of care (SoC) as per the control group. The tablet group also each received an electronic tablet computer (ASUS Google Nexus 7, Taipei, Taiwan and CA, USA) with a preloaded application which contained all SoC paper PILs in an electronic format [Table 1],

supplementary videos created by clinicians treating PCa in our institution [Table 2], and links to officially recognized PCa websites and endorsed online support groups [Table 3]. The electronic tablet was loaned to this group for a maximum of 3 months.

The control group participants were all given PILs on paper (349 A4 pages) as part of SoC following the diagnosis of PCa in our institution [Table 1].

Data collection method

The methods were reported in accordance with the Checklist for Reporting Results of Internet Surveys.^[7] The instrument used in our study was a modified validated Telemedicine, Satisfaction and Usefulness questionnaire.^[8] The control group participants received a 13-item questionnaire [Table 4]. Statements 1–8 inquired the satisfaction of the health care delivered to them from our institution and statements 9–13 asked the group to rate the information that was provided to them. All responses were gathered using a 5-point Likert scale (1: strongly disagree, 2: disagree, 3: neither disagree nor agree, 4: agree; and 5: strongly agree). The tablet group patients received a 21-item questionnaire where items 1–13 contained all statements from the control group. Questions 14–21 contained additional tablet-specific statements regarding its usage, usability, concerns, and preference [Table 5]. We performed an interim analysis from our first 31 patients (control group = 9 and tablet group = 22) which provided us feedback for usability and ensured face validity of our data collection tools.

Patients were given the option of providing the completed questionnaires electronically using a secure cloud-based access system (Qualtrics, University of Cambridge, Cambridge, U.K) or in a paper-based format. Written consent was obtained by all participants prior to enrolling them into the study. The study participants were made aware that the collected data were intended for publication and presentation. The study was approved by our local audit and service evaluation department (Cambridge University Hospitals, Cambridge, U.K: project registration number ID701 PRN6701).

Data analysis and statistics

The survey responses were entered and analyzed using an SPSS database (SPSS version 25.0, SPSS Inc., Chicago IL, USA). Nonparametric continuous data were analyzed using Mann–Whitney U-test. Categorical data were compared using a Chi-square test with Yates correction. $P < 0.05$ was considered statistically significant. Environmental analysis was performed using previously published and commented on algorithms.^[9,10]

Table 1: All patient information leaflets available on our institutional website: www.cuh.nhs.uk.

PIL	Description (number of A4 pages)
Prostate brachytherapy	Explanation of this treatment modality (4)
Robotic radical prostatectomy (1)	Explanation of this treatment modality (6)
Robotic radical prostatectomy (2)	Frequently asked questions – answered (5)
External radical beam radiotherapy	Explanation of this treatment modality (4)
Hormonal therapy	Explanation of this treatment modality (2)
Active surveillance	Explanation of this treatment modality (2)
Cancer specialist nurse	Explanation of this role and their contact details (1)
MacMillan cancer support understanding early (localized PCa)*	Explanation of this stage of PCa and its potential clinical and social implications (144)
MacMillan cancer support – help with the cost of cancer*	Explanation and advice of potential fiscal implications of PCa diagnosis (180)
Maggie's support group	How to access onsite cancer support group (1)

*For tablet cohort, this PIL was available via web link – total A4 pages=349. PILs: Patient information leaflets, PCa: Prostate cancer

Table 2: Video patient information leaflets on the tablet computer

Video PILs	Description (length of video)
The treatment decision process	Discussion of investigations and methodology of the decision-making process via a multidisciplinary approach (8 min 56 s)
Active surveillance	Explanation of this treatment modality (5 min 16 s)
External beam radical radiotherapy	Explanation of this treatment modality (7 min 17 s)
Robotic radical prostatectomy	Explanation of this treatment modality from the local operating surgeon (11 min 25 s)
Robotic prostatectomy at Addenbrookes	Explanation of the local processes involved in this treatment modality (24 min 31 s)
Robotic prostatectomy procedure	Intraoperative video of a radical robotic prostatectomy (12 min 14 s)
Brachytherapy	Explanation of this treatment modality (4 min 31 s)
Department of urology	Introduction to the department of urology, Addenbrookes Hospital, Cambridge, UK (6 min 13 s)

PILs: Patient information leaflets

Table 3: Direct web links on the tablet computer

Tablet PILs to support websites	Description
Cancer research UK	Link to cancer research UK website where supportive information can be found
PCa UK	Link to PCa UK website where supportive information can be found
Macmillan cancer support	Link to Macmillan cancer support website where supportive information can be found
Maggie's Wallace	Link to Maggie's Wallace online cancer support group
Pemberton house	Link which provides onsite accommodation for patients and family

PILs: Patient information leaflets, PCa: Prostate cancer

RESULTS

Response rates

The overall response rate for our study was 78/112 (70%). The individual response rates were 82% (46/56) and 57% (32/56) for the tablet and control groups, respectively. All the responding patients answered all questions: 48 on paper and 30 electronically.

Demographics

The median age for our tablet and control groups was 66 (interquartile range [IQR] 61–70 years) and 70 years (IQR 62–70 years), respectively ($P = 0.001$). All electronic tablets were returned in full working order, and each was used for more than one patient, after deleting all the information and re-loading the application, thus ensuring that no patient-identifiable material was left on the tablet by the previous user. All tablets and charging leads were cleansed with a universal disinfectant wipe. No patient adverse events or complaints were reported as a direct result of the provision and utilization of electronic tablets in our study.

Questions 1–8

There was a high level of satisfaction (agree or strongly agree) with their care in both the control and tablet groups from questions 1–13 (range = 91%–100% [Table 4]). There were no statistically significant differences between the groups in their responses to questions 1–8. Satisfaction with their health care for both the tablet and control groups was rated at 100%.

Questions 9–13

There were no statistically significant differences between the groups in their responses to questions 9–13. Agreement on the material being comprehensive and easy to understand was 43/46 (93%) and 30/32 (94%) for the tablet and control groups, respectively. When asked if they felt well informed about their condition having read/watched the PILs, 42/46 (91%) of the tablet and 30/32 (94%) of the control patients were in agreement.

Questions 14–21

Forty-one men from the intervention group utilized their electronic tablet (41/46 (89%)), of which 38/41 (92%) of

Table 4: A summary of the results of the patient-related outcome measures for the tablet and control groups

Question	Strongly agree (%)		Agree (%)		Neither agree or disagree (%)		Disagree (%)		Strongly disagree (%)		P
	Tablet	Control	Tablet	Control	Tablet	Control	Tablet	Control	Tablet	Control	
1. In general, I am satisfied with my health care	32/46 (70)	22/32 (69)	14/46 (30)	10/32 (31)	0/32 (0)	0/32 (0)	0/32 (0)	0/32 (0)	0/32 (0)	0/32 (0)	0.79
2. My health-care team answered my questions	30/46 (65)	15/32 (47)	15/46 (33)	16/32 (50)	0/32 (0)	1/32 (3)	1/46 (2)	0/32 (0)	0/32 (0)	0/32 (0)	0.97
3. My health-care team deals with my problems	25/46 (54)	16/32 (50)	21/46 (46)	15/32 (47)	0/32 (0)	1/32 (3)	0/32 (0)	0/32 (0)	0/32 (0)	0/32 (0)	0.70
4. My health-care team encourages me to participate in my care	26/46 (57)	14/32 (44)	15/46 (33)	17/32 (53)	3/46 (7)	1/32 (3)	2/46 (4)	0/32 (0)	0/32 (0)	0/32 (0)	0.23
5. My health-care team treats me with courtesy and respect	37/46 (80)	22/32 (69)	9/46 (20)	10/32 (31)	0/32 (0)	0/32 (0)	0/32 (0)	0/32 (0)	0/32 (0)	0/32 (0)	0.79
6. My health-care team listens carefully to me	28/46 (61)	16/32 (50)	17/46 (37)	16/32 (50)	1/46 (2)	0/32 (0)	0/32 (0)	0/32 (0)	0/32 (0)	0/32 (0)	0.51
7. My health-care team explains things in a way that I can understand	30/46 (65)	15/32 (47)	14/46 (30)	17/32 (53)	1/46 (2)	0/32 (0)	1/46 (2)	0/32 (0)	0/32 (0)	0/32 (0)	0.33
8. Most of the time, I know who my doctors, nurses, and practitioners are	24/46 (52)	14/32 (44)	21/46 (46)	15/32 (47)	1/46 (2)	3/32 (9)	0/32 (0)	0/32 (0)	0/32 (0)	0/32 (0)	0.36
9. The information material issued to me was comprehensive and easy to understand	24/46 (52)	15/32 (47)	19/46 (41)	15/32 (47)	0/32 (0)	2/32 (6)	2/46 (4)	0/32 (0)	1/46 (2)	0/32 (0)	0.84
10. The information material was written in plain language	26/46 (57)	16/32 (50)	19/46 (41)	16/32 (50)	0/32 (0)	0/32 (0)	0/32 (0)	0/32 (0)	1/46 (2)	0/32 (0)	0.97
11. I feel well informed about my condition having read the information material	27/46 (59)	14/32 (44)	15/46 (33)	16/32 (50)	2/46 (4)	2/32 (6)	1/46 (2)	0/32 (0)	1/46 (2)	0/32 (0)	0.63
12. The information material contained all the information I needed	24/46 (52)	14/32 (44)	13/46 (28)	16/32 (50)	4/46 (9)	2/32 (6)	4/46 (9)	0/32 (0)	1/46 (2)	0/32 (0)	0.22
13. The information material helped me decide what treatment I should have	25/46 (54)	11/32 (34)	12/46 (26)	16/32 (50)	5/46 (11)	5/32 (16)	2/46 (4)	0/32 (0)	1/46 (2)	0/32 (0)	0.86

P: Chi-square test with Yates correction

Table 5: A summary of the results of the tablet user group-specific questions

Question	Yes (%)	No (%)
14. Did you use the tablet?	41/46 (89)	5/46 (11)

Question	Poor (%)	Not so good (%)	Good (%)	Very good (%)
15. How did you rate the quality of information on diagnostic tests and investigations?	0/41 (0)	5/41 (12)	18/41 (44)	18/41 (44)
16. How did you rate the quality of information on treatment options?	1/41 (2)	2/41 (5)	15/41 (37)	23/41 (56)
17. How did you rate the quality of information on supportive care and research?	1/41 (2)	4/41 (10)	18/41 (44)	18/41 (44)

Question	Strongly agree (%)	Agree (%)	Neither agree or disagree (%)	Disagree (%)	Strongly disagree (%)
18. The tablet computer was easy to use	19/41 (46)	19/41 (46)	2/41 (5)	1/41 (2)	0/41 (0)
19. I could always trust the tablet computer to work	15/41 (37)	21/41 (51)	4/41 (10)	1/41 (2)	0/41 (0)
20. I had concerns regarding privacy when using the tablet computer	0/41 (0)	0/41 (0)	7/41 (17)	23/41 (56)	11/41 (27)
21. I preferred the information on the paper format	4/41 (10)	9/41 (22)	20/41 (49)	8/41 (19)	0/41 (0)

those who operated it stated that it was easy to use [Table 5]. A total of 36/41 (88%) and 38/41 (93%) tablet users rated the quality of information as good/very good with regard to the diagnostics/investigations and treatment of PCa,

respectively. No tablet users expressed concerns regarding their privacy when using the device. Only 13/41 (32%) tablet users preferred the information that was provided to them on a paper format.

DISCUSSION

Our study has demonstrated that the provision of electronic PILs had a high usage rate and did not demonstrate inferior patient satisfaction from those who are provided only paper PILs for their PCa care.

Health literacy is defined as the ability to obtain, understand, act, and communicate health information and is distinct from basic literacy skills.^[11] The use of multimedia technology such as that provided to our tablet cohort has been shown to assist in increasing patients' health literacy and engagement in their health care.^[11] The use of multimedia technology to measure the improvement of health knowledge has been shown to be applicable on a pan-educational status level of patients.^[12] Low-literacy patients and those with higher functional health understanding benefit by being provided with tablet-incorporated health-based multimedia technology.^[13] Video-based education tools have been shown to improve a patient's comprehension of the common prostate-related health issues associated with PCa interventions such as urinary incontinence and erectile dysfunction.^[14]

The delivery of health care including that of urological care is increasingly incorporating telehealth and electronic strategies.^[9,10,15] More recently, the global health-care crisis secondary to the COVID-19 pandemic has led to an increased need to deliver this care on a virtual setting.^[16] It is essential that health-care staff become familiarized with all aspects of these innovative platforms including the provision of electronic PILs to aid health care for their patients.

Nguyen *et al.*^[17] have recently shown that the high level of anxiety associated with newly diagnosed cancer cases leads to decreased information recall following their clinical consultation.^[17] Patients with a greater age were also shown to have less information recall when informed of their cancer diagnosis.^[17] Their study concluded that practitioners and hospitals are encouraged to continue exploring ways to optimize information provision to cancer patients in the current modern health care. The use of our tablet model could be one potential method to mitigate against decreased information recall following a diagnosis of PCa.

Globally, health-care providers have been set targets to ensure the increasing implementation of eco-friendly options when delivering their services.^[9] The provision of PILs in a purely electronic format could be viewed as one such strategy to reduce the reliance of paper and ink which have significant carbon footprint in their production

whether they be from recycled material or not.^[18] A patient with a new diagnosis of PCa may receive up to a total of 349 A4 pages of PILs in our institution. It is estimated that each sheet of A4 paper produces a carbon footprint of 0.0092 lbs of CO₂ (www.standardcarbon.com website accessed on September 23, 2019). Our institution diagnoses approximately 350 cases of PCa per year which potentially can equate to 122, 150 sheets of A4 paper in PILs for patients. If such a volume of A4 sheets were to be constructed on *de novo* paper, then it would have resulted from 9.75 trees to be felled for its production. This would set our carbon footprint at 1.1 metric tons of CO₂ due to paper PILs used in newly diagnosed PCa each year. The number of trees that would need to be planted to offset this carbon production would be 1.85. This environmental calculation is likely to be an underestimate as it does not take into account the carbon footprint associated with the ink that is required with paper PILs or those PILs used on other spectrums of PCa such as metastatic disease.

Smartphone and tablet ownership in the UK is increasing yearly across all age groups and now estimated to be 50% of the total population (www.statistica.com website accessed September 23, 2019). The use of health care-related smartphone applications by patients has shown to demonstrate increased adoption of a more health-conscious lifestyle and greater engagement with their disease.^[19] Our electronic PILs can easily be made available as a downloadable application for personal smartphones and electronic tablets. Our unit is now in the process of providing this downloadable service for our PCa patients in addition to making the content available on our departmental webpage.

Adopting and promoting PILs to be delivered on such paperless platforms for not only PCa but other medical conditions could be one such strategy for health-care institutions to implement environmentally minded interventions to reduce their carbon footprint. This paperless strategy could also lead to potential fiscal savings for health-care institutions. For those that do not own such an instrument, the loan of device as was performed in our study could be implemented. Our data have shown that all electronic tablets were returned in full-working order and hence used multiple times. From the results of our study, the natural progression would be to offer PCa patients the initial option of electronic PILs. These could be potentially downloaded onto the patients' personal device during their clinical consultation. However, at present, the option of paper PILs must still be available for those patients where the use of electronic option is not feasible.

One study limitation was that it used a prospective cohort design rather than a randomized controlled clinical trial. The two groups of patients were not age matched, with the tablet group being a younger cohort. This reflects the current users of tablet devices, which constitute the younger population, however the age of tablet users is expected to rise in future. Finally, the tablet group did have access to the paper PILs as part of SoC, which may have resulted in the potential contamination of questionnaire responses in this cohort.

CONCLUSIONS

The provision of electronic PILs in PCa treatment is a novel method of providing patient care with respect to this disease. Our unit is the first to report the use of electronic PILs in newly diagnosed PCa care. We hope that with further development this will allow a more environmentally and fiscally advantageous method of providing PCa care without compromising on PROMs namely patient satisfaction, comprehension, and involvement with their health care.

Financial support and sponsorship

All tablet computers utilized in this study were provided by WaveLength, a registered charity whose visionary statement includes “fighting loneliness with media technology.” WaveLength did not have a direct role in data collection, analysis, or any aspect of the drafting and editing of this paper.

Conflicts of interest

There are no conflicts of interest.

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