Perceptions about traditional and novel methods to learn about post-operative pain management: - a qualitative study.

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Title page

Perceptions about traditional and novel methods to learn about post-operative pain management - a qualitative study

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MAIN FILE

Abstract

Aim. To explore the perceptions of surgical patients about traditional and novel methods to learn about post-operative pain management.

Background. Patient education is an important part of post-operative care. Contemporary technology offers new ways for patients to learn about self-care, although face-to-face discussions and brochures are the most common methods of delivering education in nursing practice.

Design. A qualitative design with a vignette and semi-structured interviews used for data collection.

Methods. A purposeful sample of 13 post-surgical patients, who had been discharged from hospital, was recruited during 2013 - 2014. The patients were given a vignette about anticipated hospital discharge after surgery with four different options for communication (face-to-face, brochure, website, serious game) to learn about post-operative pain management. They were asked to rank their preferred method of learning and thereafter to reflect on their choices. Data were analysed using an inductive content analysis approach.

Findings. Patients preferred face-to-face education with a nurse, followed by brochures and websites, while games were least preferred. Two categories, each with two sub-categories, emerged from the data. These conceptualised the factors affecting patients' perceptions: 1) 'Trusting the source', sub-categorised into 'Being familiar with the method' and 'Having

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own prejudgments'; and 2) 'Being motivated to learn' sub-categorised into 'Managing an impaired cognition' and 'Aspiring for increased knowledge'.

Conclusion. In order to implement successfully novel educational methods into post-operative care, healthcare professionals need to be aware of the factors influencing patients' perceptions about how to learn, such as trust and motivation.

Keywords. Content analysis, educational methods, nursing, patient education, patient learning, post-operative self-care, vignettes.

Summary statement

Why is this research needed?

- Patient education is developing fast and several interventions are being tested for optimal outcomes
- New technology such as interactive websites and games is emerging for educational purposes but more knowledge is needed about the patient perspective towards traditional and novel educational methods

What are the key findings?

- Patients prefer methods which they trust, are familiar with and which meets their needs when they are motivated to learn
- Prejudgment and impaired cognition may hinder patients in using new options in patient education

How should the findings be used to influence policy/practice/research/education?

- Healthcare professionals and healthcare organisations should implement and introduce new patient education methods carefully and support patients in their use
- Nursing education should focus on the competence of nurses to plan and deliver evidence-based patient education, including keeping up-to-date with available material on the Internet
- Future research could address healthcare professionals' perceptions about novel methods and how they can complement the traditional forms of patient education

INTRODUCTION

The development of more effective patient educational interventions has been described as one of the many goals to ensure the quality of future nursing (Leino-Kilpi 2009). Information technology has the potential to revolutionise patient education and computer-based patient education programs are a promising addition to the educational process (Fox 2009). To successfully develop patient education and implement new methods and strategies, patients need to be involved. A deeper understanding of their perception, experiences and attitudes towards both traditional and novel educational media is vital to ensure successful implementation.

Background

At the core of patient education lies the teaching process, guided by theories of learning (Redman 2007) which describe the conditions under which the processes of learning are optimised (Trivette *et al.* 2009). An important part of that process is choosing appropriate instructional strategies, methods for instructions and material (Bastable 2011) and their effectiveness needs to be evaluated in relevant contexts.

One of the growing groups of patients who need a comprehensive and timely education comprises patients undergoing surgery. Nowadays, they have a larger role in post-operative self-care than before because of shorter hospitalisation times (OECD 2014) and increased emphasis on patient empowerment in healthcare (European Patients Forum 2015). Pain management is one example of post-operative self-care. Patient/family education is a crucial

part of quality pain management in adult hospitalised patients (Zoëga *et al.* 2014) because to successfully manage, patients need comprehensive and thorough education. Common and traditional instructional methods in surgical care include written information in brochures and face-to-face verbal instructions. Providing written material, especially when tailored to patients' needs, can be an effective patient education strategy (Friedman *et al.* 2011) but its use requires correct timing and satisfactory readability and it has to correspond to the patients' knowledge level (Johansson *et al.* 2004). On the other hand, the effectiveness of verbal education is sensitive to multiple factors from both the patient's and provider's side (Marcus 2014). This method is not effective on its own and should be used in conjunction with other methods (Friedman *et al.* 2011). The use of combined media is recommended, based on the available evidence on optimal outcomes of post-operative patient education (Fredericks *et al.* 2010).

Computer technology can be an effective teaching strategy to improve patient knowledge and satisfaction and to decrease anxiety (Friedman *et al.* 2011) if it has a proper design, implementation and integration process (Fox 2009). Web-based interventions accessed during recovery at home after surgery are most effective when they are interactive and allow patients to navigate the online system on their own (Fredericks *et al.* 2015). Available evidence is scarce on more specific computer-based methods such as serious games for adults (Friedman *et al.* 2011). Serious games refer to computer games which are designed for educational purposes, whether for learning or training skills, to affect knowledge, attitude or behaviour (Kato 2010). They have qualities which support learning and features which are consistent with the principles of adult learning i.e. the potential for: creating positive emotions, supporting problem-solving, encouraging active participation, using previous experience and

providing continuous feedback (Boyle *et al.* 2011, McGonigal 2011). To date, methodological differences, differences in outcome measures and definitions of terms and a lack of quality studies have made it difficult to establish the effectiveness of game use in patient education. However, the emerging evidence indicates that games can be a valuable addition to the available methods of patient education and interventions (Papastergiou 2009, Adams 2010, Kato 2010, Primack *et al.* 2012). To optimally develop and implement new methods and strategies, the perspective of the patient on traditional and novel educational methods to learn about self-care is needed. This perspective is currently lacking.

THE STUDY

Aim

The aim of this study was to explore the perceptions of surgical patients about traditional and novel methods of learning about post-operative pain management.

Design

A qualitative descriptive study with semi-structured individual interviews based on a vignette.

Sample/Participants

A purposeful sample of 13 people who had recently undergone elective surgery, either cardiac or orthopaedic, in a 600-bed Icelandic university hospital were invited to join the study and interviewed during December 2013 - October 2014. We aimed at a heterogeneous sample with regard to sex, age, education and employment. We selected these patients

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because pain management was a significant part of their post-operative care and at discharge, they were prescribed medium to strong pain medication and expected to manage their pain at home. The inclusion criteria for participants were age above 18, ability to understand and speak Icelandic, no cognitive impairment, having had a complication-free elective surgery within 30 days of data collection for a non-malignant disease and having been discharged from hospital for at least one week before the interview. Eligible patients were approached by specially appointed staff nurses in the three relevant hospital units at least one week after hospital discharge. Patients who were interested and gave their oral consent were contacted by the first author, who phoned them and introduced the study. An information letter and a consent form were sent to those interested in participation and an appointment made for the interview at a place of their choice.

Routine educational practices for these patients consist of face-to-face instruction from several healthcare professionals (nurses, physiotherapists and physicians) and the delivery of an information brochure before admission, as well as a verbal educational session at discharge. Some orthopaedic patients also attend a group education session a few weeks before admission. So far, the hospital has not provided surgery-related information on its website and no other methods are used in the education.

Data collection

Background characteristics. Socio-demographic data (age, sex, education, current or previous employment), data on type of surgery, previous experience of surgery, use in daily life of computers, tablets, mobile phones, including smart phones and use of games and quizzes - both in general and on mobiles or computers specifically, were all collected by self-

report. Data on health literacy was collected using three screening items (Chew *et al.* 2004):

(1) How often do you have problems learning about your medical condition because of difficulty understanding written information; (2) How often do you have someone, such as a family member, friend, hospital or clinic worker/caregiver help you read hospital materials; and (3) How confident are you about filling out medical forms by yourself?

Vignette. The vignette consisted of a scenario of a planned post-operative discharge education on pain management and was followed with an example of four different methods which could be used for such education: face-to-face verbal education with a nurse, written education from a brochure, or education via a website or a computer game. The vignette was guided by the principle that a constructed scenario can facilitate a discussion about something unknown (Hughes & Huby 2002, Dale *et al.* 2004) and is further described in Table 1.

Interview guide. The interview guide was based on theories and principles of adult learning and learning styles (Merriam *et al.* 2007), a literature review and the clinical expertise of the authors. The following questions were included in the interview guide and asked for each method; 1) What do you think about this method? 2) What and how is your experience of it, if any? 3) What are the possible advantages and disadvantages of this method? 4) What attributes do you find appealing and which not? 5) Are there things you could not learn about with this method? 6) What would be your reaction if I invited you to try this kind of method at the hospital (referring to the game)? 7) Are there any other methods you could think of which could be helpful in learning about self-care?

The vignettes and interview guide were validated separately by three surgical nurses and two teachers and pilot-tested with three patients who had recently had surgery. Pilot interviews,

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approximately one hour long, gave rich data and resulted in some minor adjustments in the interview guide and the addition of one media option (the website) to the vignette. The pilot interviews were not included in the study.

Interviews.

Semi-structured interviews, performed face-to-face as conversations, were conducted by the first author (a clinical nurse specialist in surgical nursing). The interviews started with the vignette where the participants were asked to describe their preferences about how to learn about pain management in an anticipated discharge after a surgery. Each of the four ways of communication was presented on a separate A4 sheet and laid in front of the participant in a random order. The participants were asked to 'think aloud' (Willis 1999) while prioritising the different methods from 1 to 4. Thereafter, the questions in the interview guide were asked for each method. The interview ended by the interviewer asking: 'Is there anything else you would like to tell me about educational methods concerning pain management that we have not yet discussed?' Probing was used to deepen, develop or clarify the interview answers.

The interviews ranged between 40-77 minutes (median 56 minutes) per participant; they were digitally recorded and transcribed verbatim. After the transcription, the accuracy of each transcription was checked against the recording.

Ethical considerations

Permission for the study was obtained from the hospital's Bioethics Committee (43/2013).

Participants were given both oral and written information and a written consent for

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participation was requested which emphasised the study's confidentiality and voluntary participation and the possibility to withdraw from the study at any time.

Data analysis

The interview texts were analysed with a content analysis approach (Graneheim & Lundman 2004, Krippendorff 2013) by the first two authors (BI and KB) using inductive, qualitative (Elo & Kyngas 2008) and both manifest and latent analysis approaches (Graneheim & Lundman 2004). The transcribed interviews were carefully read through to obtain a sense of the whole and then text about participants' responses to the research questions was identified and brought together into one text. This text was then divided into meaning units that were condensed and then abstracted and labelled with a code, continually considering the context. The original data were constantly compared with these to ensure that all relevant content was represented in the analysis. The codes were compared with regard to similarities and differences and then preliminary categories and sub-categories were created as groups of expressed manifest and latent content. Quotes were selected from the data to illustrate each category and sub-category. To validate the analysis process, the second author (KB) separately carried out the same process and both authors compared their analyses and revised and discussed them until consensus was reached. Finally, the creation of sub-categories and categories was validated by the last author (IT) through discussions of the findings (researcher triangulation). Examples of quotations, codes, sub-categories and categories are given in Table 2.

Rigour

The trustworthiness of qualitative studies can be assessed by their credibility, transferability, conformability and dependability (Elo *et al.* 2014). We have presented the audit trail of the study and described how we established credibility by recruiting participants in the study who had the ability and willingness to share their experiences and perceptions on the subject under study and who had different backgrounds and experiences. The sample size was determined by data saturation (Elo *et al.* 2014), established after the preliminary analysis of 11 interviews and the findings were further confirmed after having recruited two more participants, thus credibility was established. Through a detailed description of the data analysis and structure of the categories with confirmation by three authors, the dependability of the research findings was established. To facilitate transferability, a clear description of the context, selection and characteristics of the respondents, data collection and process of analysis was presented.

FINDINGS

Thirteen people, seven women and six men, participated in the study. The men were aged 40-72 and the women aged 46-82. Eight participants said they had never had problems learning about their medical condition because of difficulty understanding written information, while five had experienced problems occasionally. Likewise, most of the participants (n=12) had never received help with reading hospital material and eight felt extremely confident filling out medical forms (Table 3).

When ranking the different methods, nine participants put the face-to-face encounter with a nurse to learn about their pain management in first place. In second place came the brochures and websites and games after that (Table 4). Participants emphasised the importance of using

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more than one method; they said that each has its advantages and disadvantages and these are context-bound. They were all familiar with face-to-face encounters and brochures but less so with using websites and no one had experience of using games for health information purposes.

The qualitative analysis resulted in two categories; 1) 'Trusting the source', sub-categorised into 'Being familiar with the method' and 'Having own prejudgments' and 2) 'Being motivated to learn', sub-categorised into 'Managing an impaired cognition' and 'Aspiring for increased knowledge'. Each participant was assigned an alphabetical letter and is identified by these letters in the following description of findings.

Trusting the source

Confidence in the specific source was found to be pivotal and such confidence was strongly based on communication with healthcare providers, their skills, approval and recommendations. Being familiar with the method and having one's own prejudgments influenced the creation of that trust.

Being familiar with the method

Participants' choices were determined by their familiarity with each of the methods. Face-to-face education by a nurse was recognised and found to be very trustworthy. They trusted healthcare providers to choose and deliver relevant and correct information; they appreciated the human contact and the support and encouragement it could provide. The possibility of being actively involved by asking questions and sharing with the nurse their concerns was also an important attribute. The participants stressed the importance of competent nurses

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providing realistic, relevant and helpful information that was tailored to their individual needs and that the nurses should be open to questions and discussion. Not all encounters with a nurse or other healthcare providers were considered to be helpful or to support learning. Reflecting back, the participants realised that some important topics had not been addressed, for example in discharge education: 'They don't tell you at the hospital which of the pain medications is which' (D). Not all healthcare providers were perceived as skilled educators and in some cases their information and instructions were contrary to what other healthcare providers had told the participants: 'The face-to-face can be a total success or a total failure depending on the person educating; some people are educators and others are not' (C).

Also, instructions about pain management were described as inappropriate because the prescribed medication was too strong or too weak and they needed to take it more frequently or less often than they had been told. For many, strictly following instructions had resulted in intolerable pain because of ineffective management or, on the contrary, taking medication without having any pain and not having any idea if they needed it or not.

All participants were familiar and content with the use of brochures. Brochures were found to be helpful because they are always available and easy to read, although the layout and writing style were sometimes found to be boring and 'institutionalised'. They were appreciated as a guide and a reminder of what to do but had not much to offer on pain management. Still, the brochures were trusted because they were published by the hospital and the healthcare providers who the participants said must know what they were doing: 'You expect there has been a 'brochure team', ten people or so who have made this brochure together. I did what the brochure said when the professionals' instructions coincided' (I).

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The use of websites was not common but some participants and some of their spouses had used YouTube videos, which demonstrated the surgery itself. To trust the information on the Internet the participants said that they needed help: 'There is so much information on the Internet but if you don't know..., you can stumble upon something which has no evidence, of course it would have to be published by the hospital or somebody reliable' (A). Finally, as none of the participants were familiar with games as a media for learning, most ranked this media form last.

Having own prejudgments

While most participants were familiar with the Internet and used it in daily life, health-related issues were not included in their use and they had some reservations about the usefulness and reliability of web-based material in the plethora of available information. Preconceptions and scepticism like 'I trust people better than machines' (K) and preferences like 'I have other things to do with my time' (L) summarise some expressed opinions about searching for and using web-based information.

The idea of using a computer game to learn about pain management was met with mixed feelings by the participants in this study and most of them ranked it last. Scepticism, prejudices and misunderstanding mixed with curiosity, interest and lack of confidence were their first reactions. Although the vignette described a scenario of trying different pain management strategies their initial understanding was that the proposed game would be testing them for correct answers or would consist of instructions on how to behave, thus being very paternalistic. They linked the use of a computer game with various negative connotations, such as violence, guys with headphones on and woolly hats, entertainment or

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something trivial and for many, computer games were a waste of time, childish or plain irritating: 'It does not do anything for me, perhaps I am too quick to judge, I have certain prejudgments' (A). Many participants had previous experience of and enjoyed playing games on the computer such as card games, solitaire, bridge, or chess as well as more modern online games. However, associating playing a game with being a patient was a very foreign idea and some suggested that replacing the word 'game' with for example 'computer education' would have resulted in more positive reactions from them. Thus, the word 'game' did not inspire confidence in the method.

Being motivated to learn

Participants in this study described how using multimedia would support motivation and meet their emerging needs for knowledge. Verbal instructions could provide an overview of what to expect while the written material was a tool to remember practical things. A game could help them visualise unanticipated problems or scenarios and they could refer to the Internet when new problems arose or deeper understanding was required. Thus, each method had its purpose and place.

Managing an impaired cognition

The participants described how they learned to manage their pain by trial and error, guided by the [mostly] sporadic verbal and written instructions they perceived they had received on hospital discharge. Motivation to seek information through other media, for example the Internet, increased when they perceived the need to learn more because the trial and error method was not sufficient. However, motivation decreased when cognition was impaired because of anxiety, pain, fatigue and side-effects of medication. This caused slow thinking,

forgetfulness and lack of concentration, which subsequently impaired their fitness and interest to learn: 'You have all these conversations at the hospital and get very confused, you don't retain it' (I). Therefore, face-to-face meetings did not always support learning; what was discussed was sometimes easily forgotten or they forgot to ask what they had planned to ask beforehand. Consequently, the brochure was an attractive option because one could refer to it again and again, write notes in it and it helped them to remember what to do and how. However, the information on pain management was standardised, minimal and not always helpful after discharge. The general idea of using computer-based education after surgery was received in different ways by the participants. For some the idea was appealing because they had plenty of time and could get assistance from the personnel while in hospital. Others referred to how they were in no condition to learn to play a game or browse for information: 'I just felt totally exhausted and could not concentrate, I could not sit in front of the computer and use it in the beginning' (B).

Aspiring for increased knowledge

Managing pain and other self-care activities were facilitated by verbal and written instructions from healthcare professionals and supported by previous experience. It was common to experience insufficient pain relief and/or to be prescribed two or three different medications which the participants said they had little knowledge about. In spite of that, few participants perceived a need to actively strive to learn more about pain management and seek knowledge outside trial and error, or experiential knowledge. Those who did would search for information on the Internet but no-one had received recommendations from

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healthcare providers about helpful websites, although they would have appreciated it: 'The questions come afterwards, at home, when you are in the real situation' (A).

The Internet had been used to search for information about pain medication, especially side-effects: 'No one had warned me about those severe side-effects of the pain-killers, but when I had it confirmed on the Internet I contacted the hospital and got a different medication' (H).

Other resources which the participants used when aspiring to learn more would be the pharmacy, acquaintances with similar experience, or hospital staff contacted by telephone.

Confidence in using the different learning methods varied among the participants and although most of them put the game in last place when prioritising their preferences, they were interested in the idea. Some participants said that they were curious to see such a game and would have been willing to try using it if invited to do so at the hospital, given that they would have been assisted and taught how to do it. Lack of confidence in using a game was evident in statements like: 'I am too old for these computer things' (G) or: 'You would have to show me how to do it' (F). The attributes of websites and games were acknowledged for learning, such as: 'The website has updated information, is very accessible and you can find more specific information for each patient group, more than is now in the brochure for example' (B). On the other hand, others said that it was easy to get lost in the plethora of information: 'There is no one place you can go straight to, it is not as focused on your own needs as the brochure' (C). Visualising playing the game in the hospital was acknowledged as: 'I wouldn't refuse it although I can't understand it but I know many people are very receptive to it' (B).

DISCUSSION

This study explored the patient perspective towards traditional and novel ways to learn about post-operative self-care in a context which previous studies have not addressed before.

Therefore, these findings add new information to the patient education literature. Trust and motivation were found to determine how the patients perceived and chose different options of communication to learn about pain management.

Trusting the source was the primary determinant of media choice for the participants in this study and they expressed trust in healthcare professionals, concerning both the relevance and reliability of the verbal or written information they received. They also trusted the professionals to recommend quality websites which they could access when seeking information. Trust is fundamental in healthcare and involves both confidence and reliance in relationships for example between professionals and patients (Vega *et al.* 2011). The use of common and familiar sources of information, such as face-to-face discussion and brochures, was preferred by the participants in this study. They emphasised the importance of personal communication while simultaneously acknowledging its limitations. Diversity in nurses' and physicians' competence and inconsistency in information from different professionals were described and lack of individualisation and relevance to their own situations at home was a drawback of using brochures. Verbal education is not recommended on its own in patient education and while highly appreciated by patients, Marcus (2014) found, in her review, no studies measuring its effectiveness quantitatively. Although assessing the information needs of learners is of paramount importance in all teaching, studies indicate that surgical patients' information needs are not being met sufficiently in practice (Rankinen *et al.* 2007, Yiu *et al.* 2011, Klemetti *et al.* 2014). Inconsistency between what nurses perceive as important and what they actually practice in surgical patients' education has also been found (Lee & Lee

2013). Furthermore, nurses and physicians have reported having a lack of adequate patient educational skills and resources, as well as insufficient knowledge about important patient-related factors such as post-treatment conditions, impact of illness on their daily lives and how to support patients in self-care (Kaariainen & Kyngas 2010). While written information material is recommended in patient education, its general quality, including content and instructiveness, is frequently inadequate, whether delivered on paper (Johansson *et al.* 2004, Bolse *et al.* 2011, Drummond *et al.* 2013) or via websites (Ford *et al.* 2012).

Participants in this study were more sceptical about using the novel than the traditional modalities in patient education. They knew about the drawbacks and possible unreliability of websites in relation to such sensitive and personal issues as their health and were totally unfamiliar with games as a resource for learning. Trust is a key factor in determining which users who have Internet access will actually use it for health information, although consensus is lacking regarding what defines the construct of trust and thus what affects trust in health websites (Vega *et al.* 2011). It is important to address whether the information seeker trusts the website or its creator(s) and to distinguish between trust in websites versus acceptance of the technology (Vega *et al.* 2011).

Patient acceptance of consumer health information technology depends on a variety of factors such as device usability, training on how to use it, computer skills and self-efficacy (Or & Karsh 2009). Patient-related factors, human-technology interaction and environmental and organisational factors can all influence acceptance and thus are important to consider when implementing new technology with patients (Or & Karsh 2009). Usability and acceptability testing in the design process of new healthcare games indicates that study participants with

healthcare issues are receptive to the idea of using games, but usability issues can be a major concern (Reichlin *et al.* 2011). Unfamiliarity with new technology does not have to be a barrier to using it. For example, Cook *et al.* (2014) found that age, major surgery and hospitalisation were not significant barriers to effective patient education when using a combination of mobile (iPad) and personalised content management systems. We can therefore assume that given sufficient quality of the design and usability of new technology, recommendations by healthcare professionals are likely to increase patient acceptance.

Being motivated to learn was the second category analysed in this study. Motivation to learn about pain management before discharge was initially rather low, due both to impaired cognition and unrealised knowledge needs. Participants were not particularly interested in pain management per se and trusted that the information they received on hospital discharge from healthcare professionals and brochures would be sufficient. Pain management was not perceived as a learning process, even though the participants described it as a process of trial and error in many cases, indicating that experiential learning was taking place. When new knowledge was needed after suffering severe episodes of pain or taking too much medication, motivation to use sources such as the Internet increased. These findings are in accordance with the previously described characteristics of the adult learner who is most interested in learning subjects which have immediate relevance and where experience, including mistakes, provides the basis for learning (Merriam *et al.* 2007). Therefore, it is important that patients have the necessary resources at hand when their learning needs arise. It is also important that new learning methods and important content are introduced preoperatively when cognition is not impaired.

The participants in this study had high self-reported health literacy but they were in a vulnerable condition after their surgery. Health literacy is about the capacity to obtain, process and understand basic health information to make appropriate health decisions (Institute of Medicine 2004) and poor health literacy is associated with a poorer ability to take medication appropriately and to interpret labels and health messages (Berkman *et al.* 2011). Health literacy has a significant impact on the care of surgical patients (De Oliveira *et al.* 2015). It is associated with cognitive performance (Kaphingst *et al.* 2014) and can therefore be temporarily affected peri-operatively and have an impact on patients' motivation to learn about self-care. This should be considered when planning patient education.

Based on our findings we have summarised and suggested strategies for healthcare professionals, aiming to support patients in finding reliable and accessible information and facilitate their use of different media to learn about self-care (Table 5).

Limitations

We did not have the opportunity to show participants what a serious game could look like or to present a website in their own language on pain management; these limitations of the study might have affected the responses. We therefore chose to use the vignette in the data collection, which was an appropriate way to address such an unfamiliar situation. We also acknowledge that the sample was limited to post-operative patients and their perspective could differ from other patient populations. Our sample also had a high health literacy level; choosing participants with different levels of health literacy could have yielded different findings and this should be considered in future studies. The study was strengthened by using

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several different methods to collect data, such as a vignette and the think-aloud technique, which should improve the validity of the data.

CONCLUSION

Patients prefer traditional and familiar ways of learning about self-care after surgery, although they recognise their limitations. They are willing to try new learning methods, given the necessary support and assurance of their appropriateness by healthcare professionals.

To implement novel educational media/technology into post-operative care, healthcare professionals need to be aware of the factors influencing patients' perceptions about how to learn while in a vulnerable state - factors such as trust and motivation.

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Table 2. Examples of quotations, codes, sub-categories and categories

Quotations	Codes	Sub-Categories	Categories
“I have decided to trust this system... I like the brochures because I like to read, it is comforting and familiar to have something to read in your hands before going to sleep”	Choice is determined by previous experience of methods which are acceptable and trusted, even if they were not always effective	Being familiar with the method	Trusting the source
“Games are a waste of time, just pure nonsense. I find it very strange that adult people can sit and play computer games. I would rather do my knitting to get rid of the pain”	Negative connotations of media in other contexts leads to prejudgment of methods which have not been explored previously	Having own prejudgments	Trusting the source
“One isn’t so involved and I just don’t know what to ask about. When you go there (hospital) you are so nervous, and if you have prepared questions you forget them”	Impaired ability to learn due to surgery and/or post-operative treatment	Managing an impaired cognition	Being motivated to learn
“You don’t have to think at the hospital.... the questions arise when you come home.... and then you find your own program”	Variation in how to meet new self-care demands as a patient	Aspiring for increased knowledge	Being motivated to learn

Table 3. Characteristics of participants and results from health literacy screening

Background characteristics		N=13
Age mean (range)		61 (40-82)
Gender, male		6
Education		
	Basic	3
	College/vocational	9
	University	1
First time surgery, yes		5
Type of surgery		
	Cardiac	6
	Orthopaedic	7
Uses computers in daily life, yes		11
Uses mobile phone?		
	Yes, smart phone	7
	Yes, cell phone	5
	No	1
Plays games on phone/computer, yes		7
Plays games/quizzes in daily life, yes		12
Health literacy screening		
How often do you have problems learning about your medical condition because of difficulty understanding written information?		
	Never	8
	Occasionally	5
	Sometimes	0
	Often	0
	Always	0
How often do you receive help with reading hospital material?		
	Never	12
	Occasionally	1
	Sometimes	0
	Often	0
	Always	0
How confident are you filling out medical forms?		
	Extremely	8
	Quite a bit	3
	Somewhat	2
	A little bit	0
	Not at all	0
	Have no experience of it	0

Table 4. Preferred method of learning about post-operative pain management

Face-to-face	Brochure	Website	Game
First place (n=9)	First place (n=3)	First: (n=1)	First: (n=0)
Second: (n=4)	Second: (n=7)	Second: (n=2)	Second: (n=0)
Third: (n=0)	Third: (n=3)	Third: (n=8)	Third: (n=2)
Fourth: (n=0)	Fourth: (n=0)	Fourth: (n=2)	Fourth: (n=11)

Table 5. Strategies for healthcare professionals, aiming to support patients in finding reliable and accessible information and facilitate their use of different media to learn about self-care

Findings	Clinical implications	Actions
Being familiar with the method	<ul style="list-style-type: none"> • Encourage organisations to secure for patients the provision of quality education material which is relevant and reliable • Follow evidence-based guidelines when preparing and delivering education 	<ul style="list-style-type: none"> • Make teaching plans for patients on organisational level which include assessment of learning needs and evaluation of outcomes • Get familiar with new technology in patient education such as applications (app), interactive websites and serious games • Ensure competence of healthcare professionals in delivering patient education
Having own prejudices	<ul style="list-style-type: none"> • Identify the patients' understanding and experiences of different media 	<ul style="list-style-type: none"> • Demonstrate potential of new technology (how to find reliable sources) • Introduce new sources carefully and use terminology which does not discourage patients
Managing an impaired cognition	<ul style="list-style-type: none"> • Develop educational material based on different health literacy levels whenever possible • Develop education using different media which meets individual needs • Consider appropriate timing for all content, for introducing new media and for delivery of education 	<ul style="list-style-type: none"> • Consider level of health literacy • Deliver education before cognition is impaired due to surgery • Use multiple media forms to reinforce and repeat information
Aspiring for increased knowledge	<ul style="list-style-type: none"> • Find high quality educational material which can be recommended, and that covers all aspects of post-operative recovery • Consider own knowledge about what awaits patients after discharge 	<ul style="list-style-type: none"> • Support motivation with introduction of multiple media forms • Ensure that patients know where to seek information and help after discharge

Table 1. Introductory vignette with four educational methods of learning

Vignette
<p><i>Imagine that your surgery was performed a few days ago, your recovery has been as expected and your discharge is planned in two days from now. It is important for your further recovery to treat your pain successfully. The following are examples of four different ways or methods to learn about why it is important to manage your pain as efficiently as possible and how you can do so. Please read through each example and rank the methods in order of preference. While you read through the examples please describe your thoughts while you consider each method.</i></p> <p><i>Face-to-face with a nurse:</i> A nurse comes to your bedside the night before discharge and offers to go through the pain medication you will have prescribed when you leave the hospital, the best way to use it, how it works, and why it is important to treat pain. You can ask the nurse questions. Your session will last for about 15 minutes.</p> <p><i>Brochure:</i> You receive written, standardized information about pain management in a brochure about your surgery. This explains how to take the pain medication after surgery, how different medications work, and how to gradually reduce their use. The information is on one page in the brochure.</p> <p><i>Website:</i> On the hospital's website you have access to written information material about pain management in your language. There you can read about why pain management is important, how to take the pain medication, common side-effects and more.</p> <p><i>Computer game:</i> A nurse invites you to play a game about pain management after surgery with a tablet computer. The game leads you through scenarios where you can see what happens in the body when you make different decisions about pain management. The goal of the game is to achieve optimal pain relief and you score points for successful decisions and lose points for bad ones. It takes approximately 10 minutes to play the game.</p>