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CLINICAL ARTICLE

# Web-based audiovisual patient information system—a study of preoperative patient information in a neurosurgical department

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## Abstract

**Background** In the current climate of increasing awareness, patients are demanding more knowledge about forthcoming operations. The patient information accounts for a considerable part of the physician's daily clinical routine. Unfortunately, only a small percentage of the information is understood by the patient after solely verbal elucidation. To optimise information delivery, different auxiliary materials are used.

**Methods** In a prospective study, 52 consecutive stationary patients, scheduled for an elective lumbar disc operation were asked to use a web-based audiovisual patient information system. A combination of pictures, text, tone and video about the planned surgical intervention is installed on a tablet personal computer presented the day before surgery. All patients were asked to complete a questionnaire.

**Results** Eighty-four percent of all participants found that the audiovisual patient information system lead to a better understanding of the forthcoming operation. Eighty-two percent found that the information system was a very

helpful preparation before the pre-surgical interview with the surgeon. Ninety percent of all participants considered it meaningful to provide this kind of preoperative education also to patients planned to undergo other surgical interventions. Eighty-four percent were altogether “very content” with the audiovisual patient information system and 86% would recommend the system to others.

**Conclusions** This new approach of patient information had a positive impact on patient education as is evident from high satisfaction scores. Because patient satisfaction with the informed consent process and understanding of the presented information improved substantially, the audiovisual patient information system clearly benefits both surgeons and patients.

**Keywords** Informed consent · Patient information · Audiovisual patient information system · Computer animation · New media

## Introduction

In times of Internet and other mass media, a tendency towards more critical patients with rising expectations and the desire to be fully informed about their medical diagnosis and the surgical treatment is observed. Due to the continuously rising amount of medical information easily provided by the different media, a growing number of patients are already informed to a different extent before talking to their surgeon. However, the available information, freely accessible on the Internet, is mostly heterogeneous and incomplete. This makes it difficult for patients to find helpful information [7]. Moreover, the prolific information that can be obtained on the Internet can even

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confound and devastate patients leading to a mismatch between expectation and results. Many patients do not really possess the capacity to carry out the triage between bad and good, between honest and fraudulent, meaningful or useful information. Patients may even be intimidated by the non-selected and open-source information about their diagnosis and the planned surgical intervention. A careful and comprehensive explanation by the operating physician, however, can reduce patient's fears. Still, the preoperative dialogue is more than an intention to reduce fear; it furthermore serves to strengthen the relationship of trust between the patient and the physician [5]. Moreover, a thorough patient information serves as a basis for the requested informed consent (IC). The IC is an important principle of modern medicine and the quality of the process is likely to receive even more attention in the future due to complex surgical procedures and the development of social mistrust towards medical treatment [6]. Today, the preoperative dialogue commonly consists of two parts. On the one hand, an oral information by the surgeon is accomplished. On the other hand, the IC form must be signed by the patient prior to the forthcoming surgical procedure.

## Problem

A significant part of the physician's daily work consists of patient information about medical diagnoses and surgical procedures. In these dialogues the disease pattern, the process of the operation itself and the pre-, peri- and postoperative management are discussed. From a medico-legal point of view, all possible risks and complications of the scheduled intervention must be elucidated. The preoperative dialogue furthermore offers the patient a chance to ask questions regarding the operation. Even though most patients may have numerous questions they may be constrained, too excited, or too frightened to ask them. Usually, the load of information reported by the physician in a short period of time is too overwhelming for many patients, as they are not familiar with medical expressions, diseases and the general hospital management. Krupp et al. tested the patient's recall of preoperative discussion in a prospective study with 104 consecutive patients. The authors report a mean score of general information retention of less than 20% [6]. Collaterally, it should be brought in mind that too much realistic information can raise anxiety levels of patients.

Since the information given about standard surgical procedures is often identical, the surgeon has to repeat the same dialogue with different patients many times a day. In order to ameliorate the delivery of information, auxiliary materials, like charts, pictures, X-rays and models are used. Nevertheless, there is still room for improvement regarding

patient information. New ways in patient information have to be found to satisfy patient's rising expectations as well as to comply with legal requirements. It is consistent with the spirit of the time to use modern media for broad and demonstrative patient information.

We were searching for a solution to inform our patients more effectively about surgical procedures in order to amend the conversation between patient and physician before a scheduled operation. Therefore, a web- and tablet-PC-based audiovisual patient information system, as a combination of images, text, sound and video, for different surgical interventions was developed. The Internet-Link <http://www.horusmed.ch> directs to the web-based audiovisual patient information system. With the aid of the new system, patients are able to inform themselves about the planned operation by using the online programme already at home or in the hospital on a tablet-PC. The aim of this study was to investigate patient satisfaction and assess the preoperative patient information dialogue both from the patient's and the surgeon's point of view.

## Material and methods

The programme was designed in a clearly arranged manner, so that patients who are not familiar with the use of a computer could handle it easily. Furthermore, the use of technical terms was renounced intentionally. Before first application of the programme, an audiovisual self-explanatory introduction and instruction manual is initiated automatically. Sequentially, the scheduled surgical intervention can be chosen from a list and information about the diagnosis and treatment can be retrieved. Eight different elective neurosurgical interventions were available on the audiovisual patient information system. For this study, only patients scheduled for an elective lumbar disc operation were considered.

The information about the surgical intervention is subdivided into eight chapters: introduction, medical explanation of the disease, information about the hospitalisation before surgery, information about the surgical procedure (including operation videos), code of behaviour after the operation, risks and benefits of the surgery, alternatives in treatment and a conclusion. The audible and visual lectures containing image, text, sound and video are 5–20 min long depending on the intervention.

Fifty-two consecutive patients at the department of neurosurgery of the state hospital in St. Gallen (Switzerland), scheduled for an elective lumbar disc operation, were asked to use the audiovisual patient information system installed on a tablet-PC the day before surgery. All patients were then asked to complete a questionnaire. The study was conducted between July 14th, 2009 and August 20th, 2009.

In the patient's questionnaire, the patient's subjective appraisal about the multimedia patient education system was evaluated with 18 questions regarding the comprehensibility of the content, the convenience and necessity as well as the overall assessment. The patients could express their opinion on a scale reaching from 1 (fully meets patient's expectation) to 5 (does not meet the expectation).

## Results

A total of 52 patients were included in the trial (20 women, 32 men; mean age 55.06, range 21–86), all of them scheduled for an elective lumbar disc operation.

Ninety percent of all participants were very content or content with the comprehensibility of the text in the audiovisual patient information system. Eighty-seven percent were very content or content with the comprehensibility of the figures. Of all participants, 78.4% watched the operation video. All participants who watched the video were asked how they felt about the demonstration of the operative procedure. Eighty-five percent found it very appealing or appealing. Ninety-eight percent of all participants were very content or content with the information about the forthcoming operation. Of all patients, 91.8% confirmed that the audiovisual patient information system had answered open questions concerning the surgical procedure, 82.4% said that no further questions had arisen through the information programme, whereas 17.6% said that new questions had come up. Sixty-four percent of all participants declared the information content as balanced. Only 2% denounced the information content as too much, whereas also 2% quoted the information as insufficient. Thirty-eight percent were calmed and 16% rather calmed, whereas 10% were rather frightened and only 4% were frightened by the additional information in the patient information system. The remaining 32% were neither calmed nor frightened. Eighty-four percent of all participants found that the audiovisual patient information system had lead to a better understanding of the forthcoming operation. Only 2% said that the information system had only a little use and 2% said it had no use. Also 82% of the patients found that the information system was a very helpful or helpful preparation before the pre-surgical dialogue with the surgeon. None found that the information system had no impact at all before the pre-surgical interview. Ninety percent of all participants considered it meaningful to provide this kind of preoperative education also to patients that have to undergo other surgical interventions. Eighty-four percent were altogether very content or content with audiovisual patient information system and 86% would recommend the system to others.

## Discussion

Delivering professional and comprehensible preoperative information meeting increasing demands and expectations can be challenging, especially in times of easily accessible and infinite information sources such as the Internet with strongly differing measures of quality. The preoperative patient education by the physician is an essential part of the physician's duty of care and helps to strengthen the relationship of trust between patients and physicians involved in treatment [5]. For signing the papers of IC the patient has to be educated thoroughly and needs to be informed about possible complications and alternatives to the planned surgical intervention. Recently, due to legal reasons, this aspect has been emphasised even more. In most cases, education protocols are used; however, their application is limited by variability of patient's age, gender and socioeconomic status. In addition, they are not suitable for patients with limited cognitive function or for analphabetic patients. Especially in elective surgical interventions, a detailed preoperative information may convey the basis of IC.

Our audiovisual patient information system was initially developed as a web-based audiovisual patient information system to provide professional information about a forthcoming surgical procedure to patients seen in our outpatient clinic. A pilot study with 59 voluntary patients, who filled out an online questionnaire, showed that the patient satisfaction could be markedly improved by the application of this patient information system in the IC process [2]. Therefore, we installed the audiovisual patient information system on a tablet-PC and made it available for an inpatient setting as well. Because the audiovisual patient information system was already developed, we refrained from conducting a time–cost analysis in this prospective study. In a study about an information video employed for patient education before inguinal hernia surgery, Zieren et al. mentioned that the cost reduction by time saving was not necessarily relevant in each single case [10]. However, imagining a broader implementation of the system for elective interventions in other medical departments could easily result in savings of both time and money. Raising the patient satisfaction level by the relatively simple initiation of the information system and its one-time production costs has to be valued even more than actual saving of working time.

Preoperative dialogues with non-informed patients in most cases turn out to be monologues with the physician overwhelming the patient with a multitude of information such as details of the procedure itself including aftercare, benefit of the treatment and also risks and possible complications. The implementation of an audiovisual information system pre-informs the patient resulting in a better patient–physician dialogue. This helps to build up

confidence and a feeling of safety. This can be supported by our study findings.

A study by Hermann using a three-dimensional computer animation as a new medium for supporting patient education before surgery, demonstrated a distinct gain for the patient [4]. Moreover, Agre et al. reported on successful application of video-presentations [1]. In this study, patients were randomised into three groups before a scheduled colonoscopy: one group with video-presentation and education by the physician, one group solely watched the video-presentation and one group received an education by the physician only. Both groups containing the video-based information gained significantly better results than the group containing education by the physician only. A further study of Mason et al. showed that in patients scheduled for a laparoscopic sterilisation, the patients who had received a video-presentation as additional part of patient education were significantly better informed than the control group [9].

A drawback of operation videos might include the possibility of waking fear in certain patients. Especially in generally anxious patients, the listing of possible complications or watching videos of the surgical procedure might intensify their fear. In such cases, the physician should be present to answer the patient's questions in a personal dialogue. Marteau et al. demonstrated that providing too much information about side effects and possible complications could lead to higher levels of anxiety, even with the possibility of refusing surgery [8]. However, Mason et al. could show that the level of anxiety did not differ significantly in patients educated by means of video material compared to patients that were only educated orally [9]. The authors concluded that a patient education using videos for a better visualisation does not raise patient's fears concerning the intervention. As opposed to the findings of Marteau et al. Herrmann and Kreuzer used the State-Trait Anxiety Inventory (STAI) to display a significant decrease of patient's fear by showing them an educative video before an elective coronary angiography [3]. In regard to other forms of new media, Hermann showed that the use of a three-dimensional computer animation proved helpful in reducing fear in patients awaiting thyroid surgery in a prospective randomised study [4]. Our study results also indicate that the operation video did not frighten but rather reassured patients. Eighty-five percent of the 78.4% of participants, who watched the optional operation video, found it very appealing or appealing. Moreover, 38% declared that they were calmed and 16% rather calmed, whereas only 10% were rather frightened and only 4% were frightened by the additional information in the patient information system. A subgroup analysis revealed no correlation between the 78.4% who watched the video and the 21.6% who did not watch the video with the 38% who were calmed and the 4% who were

frightened by the information in the audiovisual patient information system, respectively. A possible explanation might be that it was not mandatory to watch the video. All patients could decide for themselves if they wanted to watch the video and, if not, they could easily proceed to the next step in the audiovisual patient information system without watching the video. Although this was not investigated, we hypothesise that patients who anticipated being frightened when watching the operation video, refrained from watching it. Presenting the operation details using animated schematic or anatomical drawings instead of an operation video showing human tissue including blood might solve or at least reduce the problem of frightening patients.

The danger of framed information, as provided in a uniform audiovisual patient information system, is that it may not adapt to individual patients idiosyncrasies, like instruction level, pre-existing experience with any surgical procedures or hospital stays, anxiety level, etc. These nuances are better handled with a preoperative personal dialogue between the patient and the neurosurgeon. Therefore, a balanced combination of the use of modern media for broad and demonstrative patient information together with the important personal dialogue remains always necessary in order to guarantee an adequate and sufficient patient information and IC.

A limitation of this study must be seen in the small amount of only 52 patients who participated in the prospective analysis. The future plan is therefore to amend the audiovisual patient information system with all remaining neurosurgical procedures that are performed on a regular basis and affiliate further departments or even clinics to use this audiovisual patient information system. We also plan to provide the information (text and sound) in different languages. Furthermore, a subdivision of the programme into different groups (physicians, patients and nursing staff) could be accomplished. This would enable the different groups to retrieve variable data fit to their specific knowledge by using different logins and passwords. At present, next to the daily use for in-house patients on the tablet-PC, the web-based portal can be addressed by patients, seen in the outpatient clinic, as well as by health care professionals. Additionally, the local general practitioners of the canton St. Gallen were informed and have the chance to use the programme as a contribution towards better patient education. Another limitation is that there are no true controls for comparative analysis of patient's satisfaction grade. Likewise it cannot be exactly differentiated if patient satisfaction derives from simple, fair and balanced information fulfilling all ethical, clinical and legal requirements or if high satisfaction rates are the result of this new and unusual approach using high-tech presentation of information.

## Conclusions

Despite the limitations, findings from this study support that an integration of additional educative media can support patient education in clinical daily routine. By using this information system, the patient can take an active part in the preoperative dialogue with the physician starting from a better level of information. Thus, time can be saved and used more efficiently, for example to answer important questions. The integration of the audiovisual information system into the clinical routine led to an overall increase of patient satisfaction. All patients already familiar with the system by recommendation from the outpatient setting gave us consistent positive feedback. These results give reason to hope that well-informed and educated patients can contribute to an even better therapeutic outcome in the future. Nevertheless, nothing can replace the personal dialogue between the neurosurgeon and the patient to build a strong surgeon/patient relationship fundamental to achieve good or mitigate bad clinical results.

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