Year : 2017

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An online tool for the preanaesthesia visit in the CHVR (Centre hospitalier du Valais Romand)

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THESE

préparée sous la direction de la Professeure Mette M. Berger

et présentée à la Faculté de biologie et de médecine de l'Université de Lausanne pour l'obtention du grade de

DOCTEUR EN MEDECINE

par

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Lausanne
2017

UNIL | Université de Lausanne

Faculté de biologie et de médecine

Ecole Doctorale
Doctorat en médecine

Imprimatur

Vu le rapport présenté par le jury d'examen, composé de

Directeur de thèse	*Madame la Professeure* ***Mette Berger***
Co-Directeur de thèse	
Expert	*Monsieur le Docteur* ***Marc Suter***
Vice-Directeur de l'Ecole doctorale	*Monsieur le Professeur* ***John Prior***

la Commission MD de l'Ecole doctorale autorise l'impression de la thèse de

Madame Noëmi ZURRON

intitulée

VAV – Virtual Anaesthesia Visit
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Lausanne, le 19 septembre 2017

pour Le Doyen
de la Faculté de Biologie et de Médecine

Monsieur le Professeur John Prior
Vice-Directeur de l'Ecole doctorale

Visite préAnesthésique Virtuelle (VAV) – un outil on-line pour la visite préanesthésique dans le Centre Hospitalier du Valais Romand (CHVR)

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INTRODUCTION: La sécurité tient une place importante en anesthésie. Afin de réduire les risques liés à la chirurgie et à l'anesthésie, il existe différentes stratégies de gestion du risque préopératoire, dont l'assignation d'un score ASA ou la visite préanesthésique (VPA). Cette dernière peut être rendue difficile par des facteurs logistiques, géographiques et linguistiques. Des possibilités d'information des patients par des vidéos ou d'évaluation par ordinateur ont déjà été étudiées séparément. Le but du présent projet était de développer une alternative électronique online pour la VPA classique au CHVR.

METHODES: Une première étude basée sur des données extraites du Système d'Information Clinique (SIC) a permis de délimiter la population cible. Un groupe de travail composé d'anesthésistes cadres, d'une anesthésiste en formation, d'un photographe et d'un informaticien a crée un outil d'évaluation préopératoire on-line. Un test de faisabilité a été conduit avec un échantillon de patients.

RESULTAS:
Les résultats de la cohorte 2015 montrent un âge médian de 57 ans, avec une prédominance de score ASA 2. 23,6% des patients avaient leur domicile dans la partie germanophone du canton (Haut-Valais). La distance maximale accomplie pour se rendre à une VPA était de 103km. Ces résultats ont orienté la création de l'alternative électronique appelée VAV. Elle est composée de trois éléments : 1) une liste permettant une sélection de l'opération prévue, celle-ci étant liée à un score de risque chirurgical, et une vidéo présentant les techniques d'anesthésie possibles pour cette chirurgie ; 2) un questionnaire de santé ; 3) deux algorithmes : un premier attribuant un score ASA informatisé (computerized ASA score, cASA) et un deuxième dirigeant les patients à risque vers une VPA standard. Dès que la VAV est terminée, les données sont importés dans le SIC et effacées du serveur. La VAV est prévue pour tous les patients adultes convoqués pour une chirurgie non-cardiaque. La VAV inclut une vidéo pour les femmes enceintes afin de les informer sur les procédés analgésiques disponibles au CHVR, mais également sur les techniques anesthésiques lorsqu'une intervention chirurgicale est nécessaire lors de l'accouchement.

CONCLUSION: La VAV a été développée spécifiquement pour la population du CHVR. Elle correspond au besoins actuels de connectivité web. Elle inclut des éléments d'évaluation de santé préopératoire, d'information du patient et de consentement. Le but de la VAV est de permettre une meilleure évaluation préopératoire au travers d'outils standardisés, en ciblant particulièrement les patients vulnérables d'un point de vue de leur santé, pour ainsi augmenter la sécurité périopératoire de la prise en charge anesthésiologique.

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INTRODUCTION

Safety issues have long been a concern in anaesthesia. The Helsinki Declaration on patient safety declares that patients have a right to expect to be safe and protected from harm during their medical care (1, 2) and that all institutions providing perioperative anaesthesia care to patients (in Europe) should have protocols and the necessary facilities for managing the preoperative assessment and preparation (2). The WHO Safety 2008 states that “major improvements in quality and safety in anaesthesia can be attributed to technological improvements.”(3).

The epidemiology of anaesthesia-related deaths has been studied since the mid 19th century and all over the world. Haller et al reference a dozen of recent studies from 1997 forward which highlight the changes in anaesthesia-related deaths over time. (4).
Mortality and morbidity in anaesthesia have changed importantly. In their study from 1953 Beecher et al. report an anaesthesia-related mortality of 1:1560.(5) The survey from Lienhart et al. conducted in France and published in 2006 suggests that anaesthesia-related deaths showed a tenfold decrease in comparison with a prior survey from 1978-1982, reaching a rate of 5,4 in 100'000 anaesthetic procedures, i.e. 1:18'500(6). This is a twelvefold reduction in comparison with 1953. Today, the chief cause of anaesthesia-related mortality is cardiac arrest, caused by hypovolemia, myocardial infarction or respiratory failure. (6) Diffferent strategies have been explored to reduce anesthesia related morbidity and mortality, such as general security improvements, identification and stratification of the severity of the patient’s condition, and the preoperative visit.

Security and safety improvements in anaesthesia have been inspired, amongst others, by security challenging industries like aeronautics. (7) Research has focused on the human factors involved in anaesthesia-related mortality. With growing complexity of both anaesthesia and surgical procedures, human factor induced errors increase. (8) As in other areas of human activities which adress security issues - earthquakes, avalanches, financial transactions - risk calculation has got an important place in medicine and particularly in anaesthesia.

The ASA Score (American Society of Anaesthesiology) is one of the oldest scores still used in anaesthesia. This score was developed in 1940 to adress statistical puposes (9), but it became rapidly evident that it was an useful tool to evaluate the risks of anesthesiological procedures. Its reliability has often been questioned, as there is a subjective touch of the single classification of a patient. Wheras in the beginning the ASA expressily did not want to give examples to help the assignement of an ASA class for a single patient, in recent years and in front of the growing complexitiy of medical conditions, they accepted to illustrate the ASA classes with examples. (10) A recent study from Hackett states that the ASA Score "has strong, independent association with post-operative medical complications and mortality across procedures. This capability, along with its simplicity, makes it a valuable prognostic metric." (11) There are currently 6 ASA classes (last approved by the ASA House of Delegates on

October 15, 2014) ranging from ASA 1 - a normal healthy patient - to ASA 6 - a declared brain-death patient whose organs are being removed for donation purposes.

Besides the ASA scoring, another risk reducing strategy has been the introduction of a structured preanaesthesia visit (PAV). The first scientific article regarding a PAV was published in 1949 (12). Lee suggested the creation of an anesthetic out-patient clinic for this purpose (Pre-anesthesia Clinic, PAC). Until the 80's, a PAV was rather an exception than a regular part of anaesthesia. In France, the PAV has become a legal obligation by Ministerial Order in 1994. The change from an in-patient pre-anaesthesia visit to an out-patient PAC has been implemented in the last decades. Blitz et al showed that a PAC visit had an impact on the postoperative in-hospital mortality. (13) On the other hand, even if the PAC has been designed to enhance patient evaluation and security, it can be a burden for the patient as he has to travel separately to the hospital for the PAC with work absence issues and other impacts on his life. (14)
Geographical, linguistic and logistic difficulties can represent barriers to the implementation of a PAC, the geographical ones beeing particularly important for the canton of Valais, object of this study. Linguistic barriers not only reside on the patient's side, but also in health professionnals with insufficient language knowledge.

The aim of the present project was to develop an electronic alternative to the conventional PAV in the French speaking part of the Hôpital du Valais (HVS), the Centre Hospitalier du Valais Romand (CHVR). Therefore an analyis of the Valais's population structure and geographic distribution of patients was a prerequisiste to be able to adapt the alternative to the patient population treated in the CHVR.

METHODS

The electronic alternative to a standard pre-anaesthesia visit is named Virtual Anaesthesia Visit (VAV). Two major constraints guided the project. The first was that a VAV should be as close as possible to the conventional PAV, and the second was guided by the adage:"Keep it (as) simple (as possible) !".
The development went through three different stages: an observation phase, a development phase stricto sensu and an evaluation phase to test the feasibility.

Observation phase

This phase started in september 2014 and finished in spring 2015. The observation was conducted by the trainee anaesthetist (NZ) under supervision of senior anaesthetists from the anaesthesia department of the CHVR and the doctoral thesis supervisor.
The HVS is computerized and patient's informations are recorded in the Clinical Information System (CIS), named Phoenix (CompuGroup Medical Switzerland AG), enabling data extraction. The entire HVS was first considered, and then separated in two parts of the insitution (CHVR-French speaking and Spitalzentrum Oberwallis SZO-German speaking). Only the CHVR was further studied.

The existing documentation was collected, and telephonic interviews with collaborators of these units were conducted for a description of the current workflows.
A statistical analysis of the popluation who had benefited from a PAV was conducted on anonymized data from the year 2015. These data were extracted from the general database of the Hospital, with the following criteria: gender, age, ASA status, Date of completed PAV in the CIS, PAV in the PAC (not in the emergency room, ward or operating theatre), emergency of the case, planned case at distance (more than 36h, less than 36h), annulation of the operation and postal code. The Excel database was analyzed further to understand the relationships between emergency and elective interventions, (defined as those planned more than 36h in advance), the ASA status of patients in these categories, and the anesthesia techniques most used at the three hospital sites, in order to project the VAV and plan the necessary videos. A distinction was made between ASA 1 - 2 and ASA 3+ (meaning ASA 3 – 6) patients, the latter presenting more health related risks for surgery and anaesthesia.
Statistics data, while collected on Excel files, were analysed using STATA.

VAV Development phase

This phase started during spring 2015 and is scheduled to end summer 2017.
A group composed of senior anaesthetists, a trainee anaesthetist (NZ), a photographer (JF) and a computer scientist (GP) - all employees of the CHVR at the beginning of the project - created a new online preanaesthesia assessement tool. This tool is composed of: a selection of the surgical procedure by the patient, an electronic Patient Assessement Questionnaire (ePAQ), a short video information about the assigned anaesthesia technique and a first informed consent.
Patients targeted by the VAV: As an internal hospital decision has been to do systematic ECG and blood sampling in patient > 40 years. VAV was intended for the population between 18 and 40 years old, who need no paraclinic exams.
The tool itself relies upon two algorithms:

1) the cASA algorithm assigns a computerized ASA (cASA) status to each patient,
2) the VAVplus algorithm - based on the surgical risk (see below), on the cASA status and on some end-points called yellow and red flags - assigns selected patients to a standard PAV.

The tool was created using the programs Excel, Visio (Windows) and myBalsamiq (https://balsamiq.com/company/#contact) for the internet platform.

Development of the Web Portal

Angular, Boostrap and Survejs were used for the development of the front-end, Microsoft.Net WCF and MariaDB for the back-end. The VAV visits are managed through the Clinical Information System (CIS) (Phoenix from CGM).
A secured acces is guaranteed through an individual link for each patient and an access with a token received on the mobile phone by the patients. When the questionnaires are completed, and the videos viewed, the patient closes definitively his VAV. The data is then imported from the web-page into the CIS, and definitively deleted from the external web server.

Surgical and correspondent anaesthesia procedure

A list of surgical procedures (see appendix) was generated using a standard Excel program. This list is based on the list of surgical procedures inside the CIS used for documentation.

The surgical procedures were classified according to anatomic locations and subdivided again in procedures on skin, muscles, bones, organs, or the category "other". Where it applied, the sides (right / left) are distinguished.

A surgical risk class ranging from 1 - 3 has been assigned to each procedure, inspired by the ESC/ESA Guidelines on non-cardiac surgery (15) which presented these risk categories adapted from Glance (16).

One or two possible anaesthetic procedures have been assigned to every surgical procedure. General anaesthesia has been defined as the standard anaesthesia technique. Where it applied, a second standard anaesthetic procedure has been assigned: either a regional anaesthesia, an alternative anaesthetic procedure or an addition of another anaesthetic procedure for purposes of managing postoperative pain.

ePAQ (Electronic Patient Assessement Questionnaire)

The ePAQ was designed using Visio Programme and later on, Excel and Ongular J (Javascript).

The sequence of questions has been underpinned by the well-known ABCD-Schema (Airway, Breathing, Circulation, Disability) used in emergency medicine. Possible interferences in anaesthesia from neurological, metabolic and renal origin have been integrated in the last category.

A positive answer to a general question will open subsequent questions to further graduate the comorbidity. The ePAQ integrates some standard used scores for the evaluation of the health status, as evaluation of the metabolic equivalents (MET), the Body Mass Index (BMI), adapted Revised Cardiac Risk Index (RCRI) (without value of Creatinine), New York Heart Association Classification (NYHA), Canadian Cardiovascular Society (CCS). It also includes a minimal Airway Assessement (Mallampati Score), evaluated by the patient himself.

Either yellow or red flags were attributed to enable ranking specific risk items: Yellow flags are anaesthesia-related risks without a direct impact on the ASA score but with a strong indication for a face-to-face PAV (for example, a family history of MH or a known difficult airway), while red flags were attributed to given health conditions (for example, BMI > 35, active cardiac condition) which make mandatory a PAV at the PAC.

Video information about the assigned anaesthesia technique

Video sequences were filmed using standard photographic equipement (Lumix (Panasonic) GH2 with an objectif 14-140mm) and a chest microphone RØDE with its wireless transceiver RØDELink inside the operating theatre of the sites of Sion and Sierre.

The anaesthesia and operating room team - nurses, doctors, other staff members - collaborated to make video sequences. Anaesthesia doctors and nurses acted as patients for some procedures, and some selected patients gave their oral consentement to being filmed provided they would not be recognisable. Familiy members of the doctorante drawed and filmed the short introduction video sequence guided. The information video's amateur form was a choice in order to restitute the

environment of the CHVR and to give a sensation of déjà vu for the individual patient in order to reduce anxiety and give a sensation of comfort.

The video sequences were edited using iMovie (Apple Inc.). The video material was then cut togheter with the programme Final Cut Pro X (Apple Inc.) and voice off sequences recorded using Garage Band version 5.1 (Apple Inc.) and added to the video material.
A total of four different videos including the most used anaesthesia techniques at the CHVR (see page 17) were generated, matching the surgical procedures. (see CD).

Development of the computerized (c)ASA algorithm and the VAVplus algorithm
The construction of these algorithms integrates elements of the surgical procedure list, ePAQ and short video information.

VAV Evaluation phase

A first test phase was conducted as a feasibility test during spring 2017 with a random sample of patients called up for a standard PAV in Sion and Martigny, without preliminary advice, during two and a half days. All patients scheduled these days, older than 16 year, capable of reading and understanding French, and having a valid e-mail adress, were asked to test the new questionnaire. Oral and written information was given and written consent was required.

The test was conducted as follows:
- Anonymous login to a test version of the questionnaire, not linked to the CIS
- Answering the questionnaire
- Watching one of the videos corresponding to the scheduled operation
- Answering a short anonymous questionnaire (see Appendix) created on Google Forms, including the QQ-10 questionnaire (french version)(17) and questions to evaluate the suitableness of the video sequences.

The following elements were documented: Date of the PAV, PAV site, gender, consent given to the test, completion of the questionnaire, watching of the type of video and type of anaesthesia, total time needed for these two steps, and completion of the evaluation questionnaire. As all recorded data were anonymous, no approval of the local research ethics commitee was needed.
The electronic questionnaire validity has been evaluated using the QQ-10 (17) questionnaire.
On the base of the online questionnaire summarized in a pdf document, the computerized cASA score was manually calculated using the cASA algorithm (see appendix). The BMI was calculated, and red and yellow flags noted. The subsequent algorithm was then applied to determine if there is the need for a mandatory PAV. The cASA score was compared to the effective (e)ASA score given by the anaesthetist in the standard PAV at the end of the test phase, this one having been verified by a senior anaesthetist. The proportion of concordance of the cASA and eASA status has been determined.

A subsequent research phase has been projected in the thesis plan but not been conducted due to delays in the development of the VAV and financial difficulties.

RESULTS

RESULTS FROM THE OBSERVATION PHASE

Geographic and political characteristics of the Canton du Valais

The canton of Valais is one of the 26 cantons of Switzerland. It is characterised by an alpine structure with a central plain, lateral valleys and mountains.

The canton is bilingual, German beeing spoken in the Upper and partially in the Middle Valais, and French in the remaining part. Lateral valleys end usually in the principal Rhone Valley. The distance between the two villages furthest away from each from another through this valley is 161 km (Obergoms to Port-Valais).

Hospitals in the Valais region

The canton of Valais counts 9 hospitals in 2015: two public hospitals - Hôpital du Valais (HVS) and Hôpital Riviera-Chablais - and 7 private clinics: Valère, CIC Valais, Leukerbad (RZL), Clinique Romande de Réadaptation (CRR), Clinique genevoise de Montana, Clinique bernoise de Montana, and Luzerner Höhenklinik Montana.(18)

The HVS is a network composed by nine institutions, among which five perform surgical interventions. They are distributed along the the plain of the Rhone River: Brig, Visp, Sierre, Sion and Martigny. For the current study, the french speaking part of the HVS hospital only is considered, this is the CHVR (Centre Hospitalier du Valais Romand) with the sites of Sion, Sierre and Martigny.

The following figure 1 shows the borders of the three regions of the Canton (dark grey: Chablais and Martigny, white: Middle Valais, clear grey: Upper Valais) and the distribution of the hospitals:

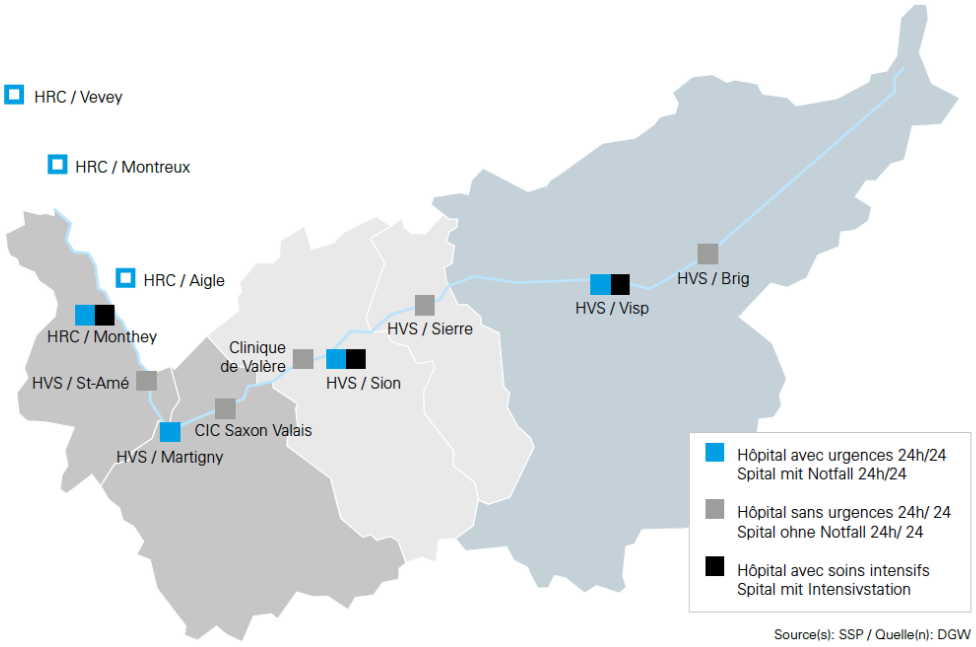


Figure 1 (18)

Current workflows for the PAV

The CHVR integrates three distinct hospitals and operating sites - Sion, Sierre and Martigny - but only two PAC in the sites of Martigny and Sion. The distribution of the surgical specialities on all three sites is shown in table 1:

	Sion	Sierre	Martigny
Surgical Speciality	General, Visceral, Neurosurgery, Cardiac and Thoracic, Vascular, EET, Traumatology, Orthopedics, Pediatric, Obstetrics, Gynaecological, Urological	Orthopedic (minor, upper extremities), Plastic and Hand Surgery, Urology	Gynecological, Ophtalmology, Orthopedics (minor, lower extremities)

(Table 1)

This distribution of the surgical actitivites matters as it results in a distribution of patients related to their ASA status, the emergency of the intervention, anaesthesia techniques and surgical risk profile, as shown later on.

Once the surgical indication is decided and the surgeon has obtained the informed consent from the patient, he announces the scheduled operation in the CIS. All announces are transmitted to the preanaesthesia office either in Martigny or in Sion. It is also possible for surgeons working outside of the hospital to announce patients for an operation through a special e-mail formulary, called "no replay". These announces are time-consuming as they need to be inserted manually into the CIS by the PAC office. A check in January 2017 showed that in Sierre there were 45 demands of this type, but 31 came from surgeons also working in the CHVR and having access to the CIS, so they might have completed the announce directly in the CIS. In Martigny, the caseload was less than 10 demands during January 2017. Efforts are made to reduce these "no replay" demands and achieve a direct anouncement by the surgeons in the CIS.

There is one single preanaesthesia questionnaire (see appendix, Source (19)) for all sites, which is currently sent to all patients by mail by the PAC, which controls also that all necessary documents are available on the day of the PAV.
In Sierre, the only hospital without a PAC, the patients in whom a local anaesthesia, a locoregional anaesthesia of the upper limb, or a sedation are planned by choice of the surgeon, will get an information document by him explaining the different anaesthesia techniques (1 A4 sheet, see appendix, source (19)). They are asked to read it and to sign for informed consent, but they are not invited for a PAV. They also get the preanaesthesia questionnaire by the surgeon and are requested to fullfill it and to bring it on the day of the intervention. They will see the anaesthetist on duty on that day. All other patients, i.e. patients for whom general, central neuraxial and locoregional anaesthesia of the lower extremities are planned, will get an appointement for a PAV at the PAC in Sion.

In Martigny, all patients are invited for a PAV. If it applies, patients receive also an information sheet on regional anaesthesia techniques for pain relief (see appendix, source (19)) prior to the planned PAV, and they get the preanaesthesia questionnaire at home.
In Sion, all patients are invited for a PAV if the intervention is announced more than five days in advance by the surgeon.If it is announces less than five days in advance, they are seen on the ward or in the operation theatre on the day of the intervention.
On the day of the PAV, the anaesthetist collects the data, discusses them with the patient and completes the history with a thourough examination. The anaesthetist then orders the necessary para-clinic exams. An internal order dating from 2011 (source (19)) states that all patients older than 40 years need an ECG and a laboratory testing for fasting glucose and creatinine, and those older than 60 years need additionally a laboratory for a blood formula and a thorax radiography. The anaesthetist then weights the patient-related risks to the surgery-related and anaesthsia-related risks, proposes an anaesthetic strategy for the individual patient and discusses it with him in order to obtain an informed consent. The actual workflow is shown in table 2 (annexe), the column at the left indicating who is in charge.

The analysis of the different workflows shows that these are not orientated around the same criteria. There is no clear rationale behind these differences regarding a point of time (3 weeks / 5 days) or an anesthesia technique. This can lead to inequality in patient's treatment, and to internal errors according to Reason's Swiss Cheese Model of Errors.(8) A special difficulty is the absence of a PAC at the site of Sierre. The paper-form is an additional limitation to the actual system. Often, the patients arrive at the PAC without having completed the questionnaire, or having forgotten it at home, or another person having completed it at their place has completed it. Moreover, the patient fills in these forms and thereafter the anesthetist has to fill in the content again into the Clinical Information System (CIS).
Patients travel between sites; however, the documents don't always follow the patient's path. There are no data up to day describing how much of these paper forms are lost prior to a PAV, but the experience indicates that it is not rarely the case. This is a waste of time, knowing that the anesthetist has an average of twenty minutes for a single PAV. Not only does an already completed form need to be completed again, but also it remains that an anesthetist has to fill in a mask in the CIS when his core duty would be to complete a thorough history and examination, and a risk stratification in order to determine eventually a pre- or peri-operative health optimization plan.

These results suggest that a web-based and standardized procedure in advance of a PAV could overcome some of these limitations, and enable the anesthetist to dispose of essential elements of the patient's history in advance, in order to perform a more targeted.

Population analysis

The first document consulted was the internal statistic of the HVS (not published document, only for internal use). This one reported only the PAVs which were conducted in the PAC, and the data about the percentage of those PAVs - 41,6% - seemed underestimating their total number. As the aim was to

include all patients having had a PAV wherever it was (ward, operation theatre, emergency room, PAC), an Excel database was created extracting data from the AIS including all patients having had a fulfilled a PAV in the AIS. This enlarged database permitted a deeper and better understanding.

A statistical analysis was conducted to obtain information about the differences in elective or emergency operations, ASA status and the differences in anesthesia techniques used in the three sites in order to plan the electronic alternative. One difficulty of this analysis was that the workflow for the PAC at Sion determines a period of five working days for an appointement to the PAC, but the CIS only offers 3 categories: emergency case (less than 12h), emergent case scheduled less than 36h in advance, emergent case scheduled more than 36h. Elective interventions are thus defined as those where the intervention is scheduled more than 36h after the documented PAV in the CIS.

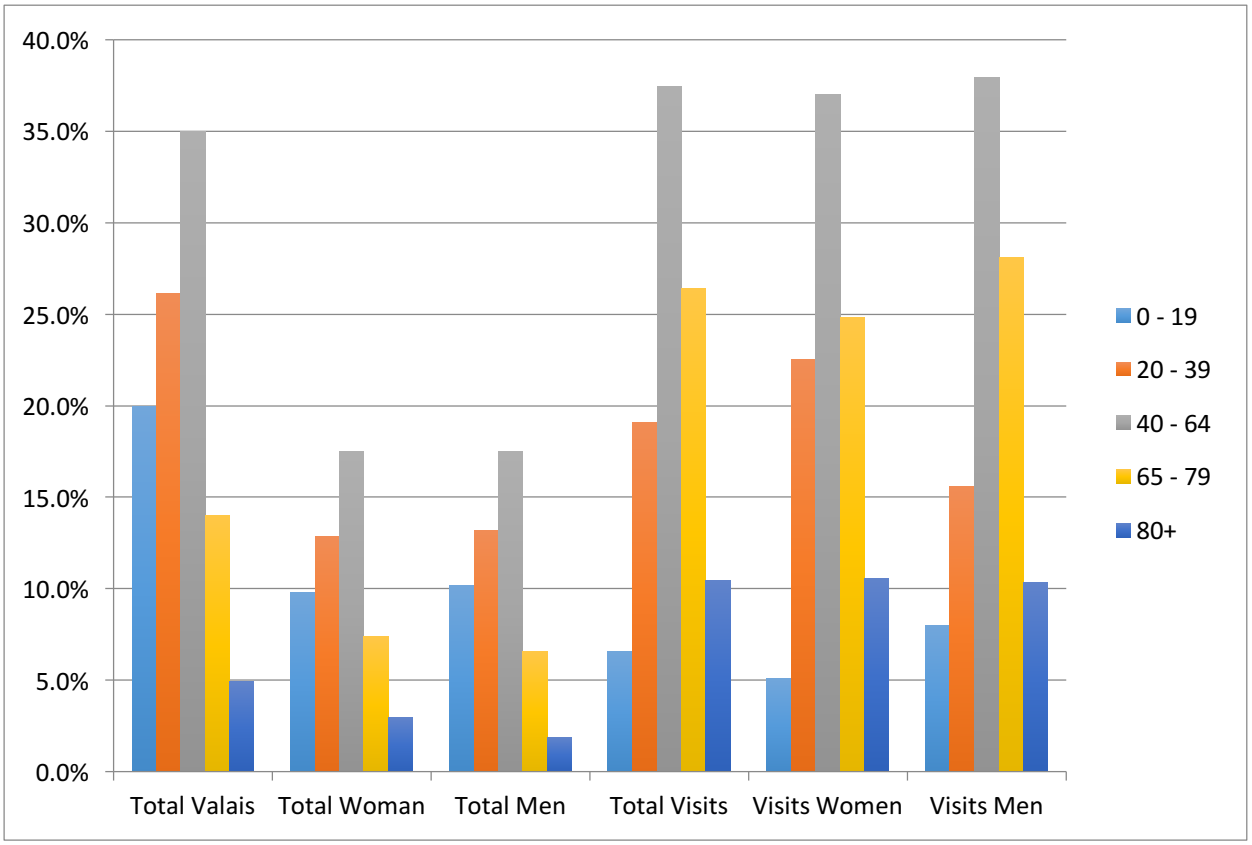
This gap between the workflow and the CIS documentation (and the subsequent Excel database used for the statistical analysis) can explain the difference between the internal statistics of the HVS (which reports a total of 41,6% PAVs at the PAC) and the extracted broader database used for this research, which reports a total of 71,7% documented PAVs, regardless of the place those were performed at (not only those factured at the PAC).

A total of 12'579 files remained after removing duplicates from the initial 17'597 file list. The files belonging to the SZO were then removed. The remaining files - 8'797 - from the CHVR and included in the statistical analysis.
Martigny had 1'976 files, from which 1'628 were elective interventions (> 36h). Sierre had 2'363 files, from which 1'796 were elective interventions. Sion had 4'458 files, from which 2'885 were elective interventions.

Age profile of the patients versus the general population (2015)

In 2015, the resident population of the canton of Valais was 335'696 inhabitants, 49,6% men and 50,4% women. Of this population, 75,4% lived in the french-speaking part of the Valais (35,7% living in the Bas Valais and 39,7% in the Valais Central).
A total of 12'579 persons had a PAV (see page 12) during the year 2015, which represents 3,7% of the total population of the canton Valais. The median age was 57 years (range: 0 to 107).

Figure 3 shows the distribution of age categories and gender for the total of habitants of the canton Valais (Source (20)) and for those who had a PAV at the HVS during the year 2015.



(Figure 3)

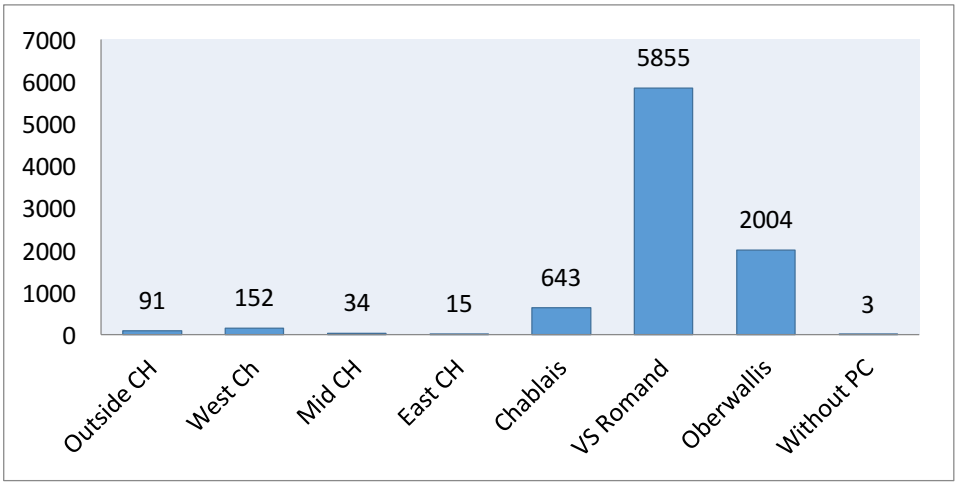
This figure is important to understand the cutoffs for age during the development of the VAV, as more than 50% of the Valais inhabitants are aged older than 40 years.

Considering that the VAV was intended for the population aged 18 to 40 years, who need no paraclinic exams, the median age of 57 years of the CHVR anaesthetised population needs special attention. The above figure shows that more than 70% of the patients who had a PAVin 2015 would not have benefited from a VAV, even if in good health, because of this single exclusion criteria. Moreover, literature review shows that the internal order is not based on current evidence, who states that age *per se* is not an independent risk factor (15). As the VAV also includes surgical risk categories, the NICE Guidelines might be used for the determination of preoperative testing. (21). There should be no cutoff for age catogries in adult patients, and the paraclinic exams adapted to current evidence. To enable a real triage effect the algorithms underpinning the VAV should be guided by the existing comorbidities (expressed as red flags in the VAV) regardless of age.

Geographic origin of patients (place of residence)

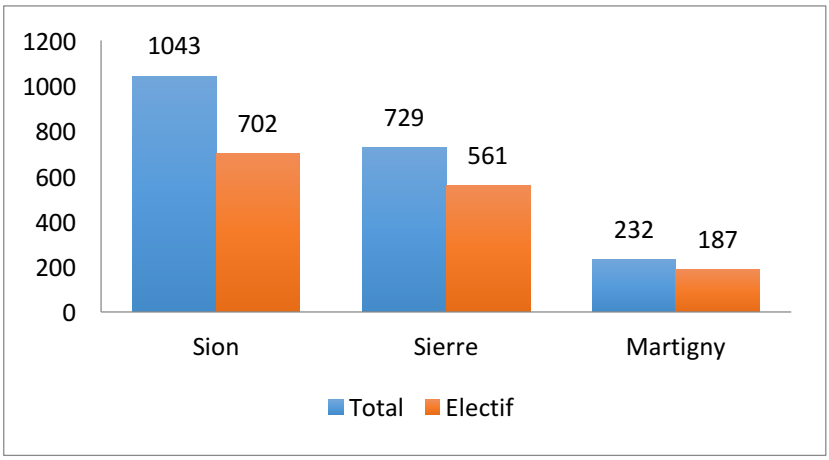
The origin of the patients has been determined using the postal codes (PC) (place of residence). Patients outside of Switzerland represent 1%. The majority of the patients was living in Valais (96.6%); 2,4% of the patients came from other regions of Switzerland (East, Mid or West Switzerland), and only 1% of patients were from outside of Switzerland.

The patients from Valais had the following distribution: 7.6% were from the Chablais and Martigny region, 68,9% from the Middle Valais region and 23,6% from the Upper Valais region (German speaking). The following figure 4 shows the origin of the patients in function of their site of residence.



(Figure 4)

Patients having had a PAV during 2015 and living in the Upper Valais region represent 2,5% of the total inhabitants of the Upper Valais and were distributed in the three hospitals as shown in figure 5:



(Figure 5)

It appears that almost one out of four patients (23,6 %) having had a PAV at the CHVR is currently living in the Upper Valais. They face with language barriers, which make an adequate PAV and informed consent difficult. Even if the CHVR defines itself as a bilingual hospital, not all anesthetists are effectively also German speaking.

Sometimes, for facility and distance purposes, a PAV may be conducted by an anesthesiologist of the SZO into their respective PAC's, but not into the CIS, using only paper documentation. This is another potential source of difficulties, and a potential source of error. Documents do not always travel with the

patient and reach the hospital in which they are operated. Hence, the flow of information is not always guaranteed.

Another difficulty arises from the geographical distance, which makes it difficult for some patients to come to Sion or Martigny for a PAV. For the site of Sion, the patient living the furthest away is from Bellwald, which represents a distance of 78 km (1h20 by car, 1h50 by public transportation), and for Martigny, a patient from Ausserbinn, representing a distance of 103km (1h40 by car, 3h10 by public transportation). These distances represent a time-consuming difficulty as often the patients have to find someone to accompany them, to drive the car, and mobilizes family members or friends.

This distribution from the origin of patients underpinned the VAV project in that an electronic and standardized alternative in both languages, French and German, would be patient-friendly for communication purposes, as it addresses an important part of the patient population of the CHVR.

Emergency versus elective interventions

Scheduled interventions predominate in all sites. The proportion in Martigny is 82,4% of the cases, in Sierre 76% and in Sion 54,7%. These patients should have a preanaesthesia an appointement at the PAC, the emergency patients wil have a PAV on the ward, in the emergency room or just prior to entering the operating theatre.

Anaesthesia techniques

In Sion, most of the interventions are performed under general anaesthesia (75.4%), whatever the ASA status, far before regional anaesthesia techniques (10,1%), combined anaesthesia (4,5%) or Standby (2,5%).

In Sierre, general anaesthesia (46,3%) and regional anaesthesia techniques (44,9%) are used almost in an equal proportion. Combined anaesthesia (1,1%) and Standby (4,3%) are a minority.

In Martigny, general anaesthesia (49,3%) is the most frequent anaesthesia technique for all interventions, followed by regional anaesthesia techniques (17,1%) a large proportion of combined anaesthesia techniques (12,2%) and Standby (11,2%).

The analysis of the elective interventions shows that in Sion, there is nearly the same proportion of general anaesthesia (75,8%), regional anaesthesia (9,4%), combined anaesthesia (5,6%), and Standby (2,3%). In Sierre there is a little shift from regional anaesthesia (41,2%) to general anaesthesia (50,2%). In Martigny the proportion of anaesthesia techniques does not really differ from the overall proportions.

These results - showed in figure 6 - uncover regional differences regarding anaesthesia techniques.

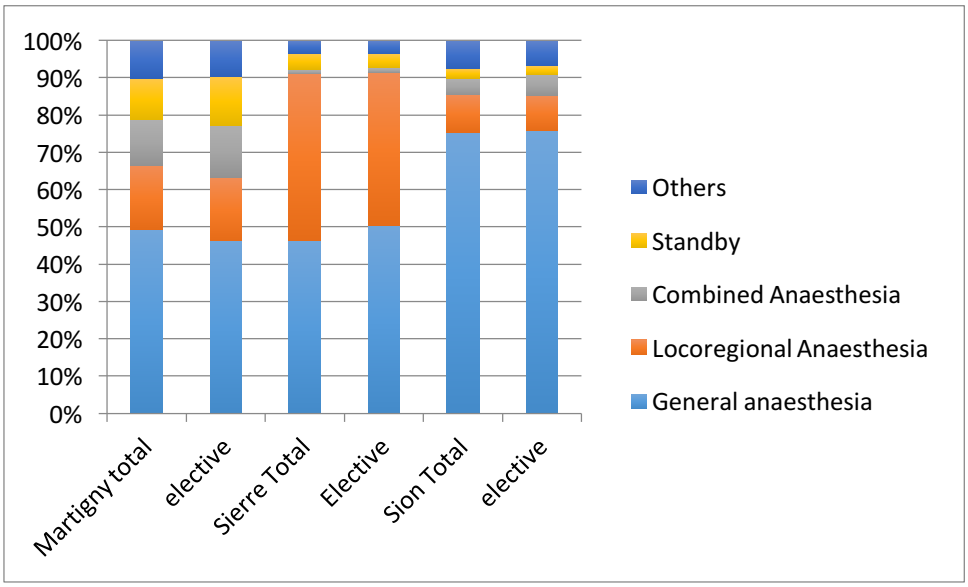


Figure 6

In conclusion, the most used anesthesia technique is general anesthesia in all 3 sites regardless of emergency or scheduled condition, followed by regional anaesthesia techniques, combined anaesthesia and standby. Locoregional anesthesia techniques are popular particularly in Sierre.
These most frequent anaesthesia techniques have been selected for the patient information videos.

ASA status of total patients

The distribution of ASA status of patients - showed in figure 7 - is as follows: in Martigny there are 20.5% ASA 1 patients, 56,2% ASA 2 patients, and 13,1% ASA 3+ patients. There is an additional 10,1% of non-documented ASA status (named "missing" in figure 7), which could contribute to increase the ASA 3+ patients. In Sierre the ASA 1 patients represent a 17,3% of the cases, the ASA 2 patients 53,3% and the ASA 3+ patients 20,2%, and a total of 9,2% have non-documented ASA status. At the site of Sion, ASA 1 patients represent only 18,13%, ASA 2 patients 47% and ASA 3+ patients elective 20,2%, and a total of 7,6% have no documented ASA status. The proportions for elective patients at all sites don't show real differences.

A deeper analysis of the ASA 3+ patients shows that there are only two ASA 5 patients reported at Sion under the category "emergency". This doesn't mean that in the CHVR there are no more ASA 5 patients having an operation. Indeed, there are 15 cases for the year 2015 mentioned in the internal statistic. But it means that the data, based on the existence of a documented PAV in the AIS, regard only those patients where time allows to fill in this form - which in ASA 5 (a moribund patient who is not expected to survive more than 24h with or without an intervention) is rarely the case.

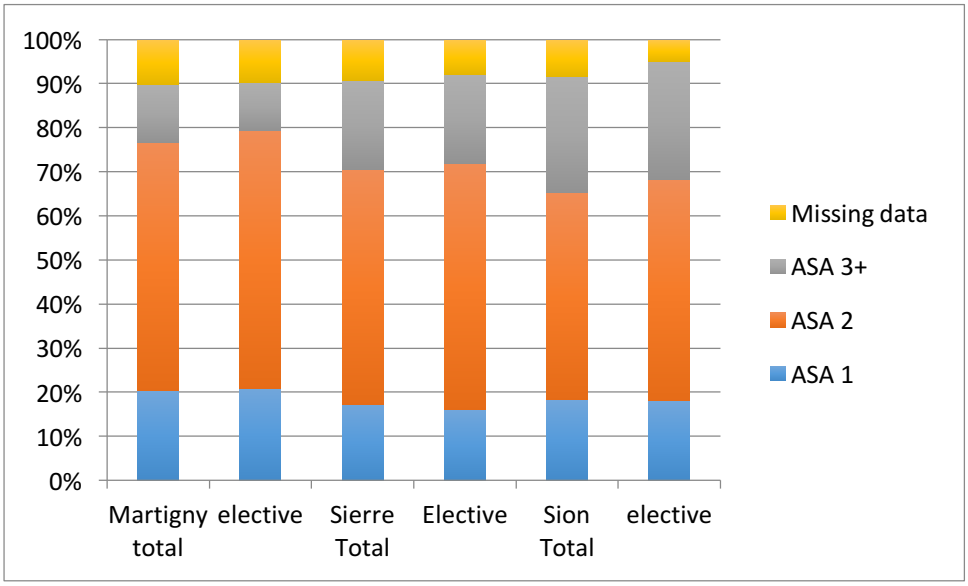


Figure 7

ASA status of the elective patients

For the study of the PAV, the next focus is on elective cases only, as the VAV project is not intended in first line for emergency cases. Regarding the ASA status across all sites in 2015, the majority of the elective cases were classified as ASA 2 patients. This is in agreement with the internal statistic of the HVS 2015.

As shown in figure 7, for Sion the proportion of ASA 3+ patients is 26.7%, in Martigny 11.1 %, and in Sierre 20.2 %.

The distribution of the ASA status for elective interventions is shown in figure 8.

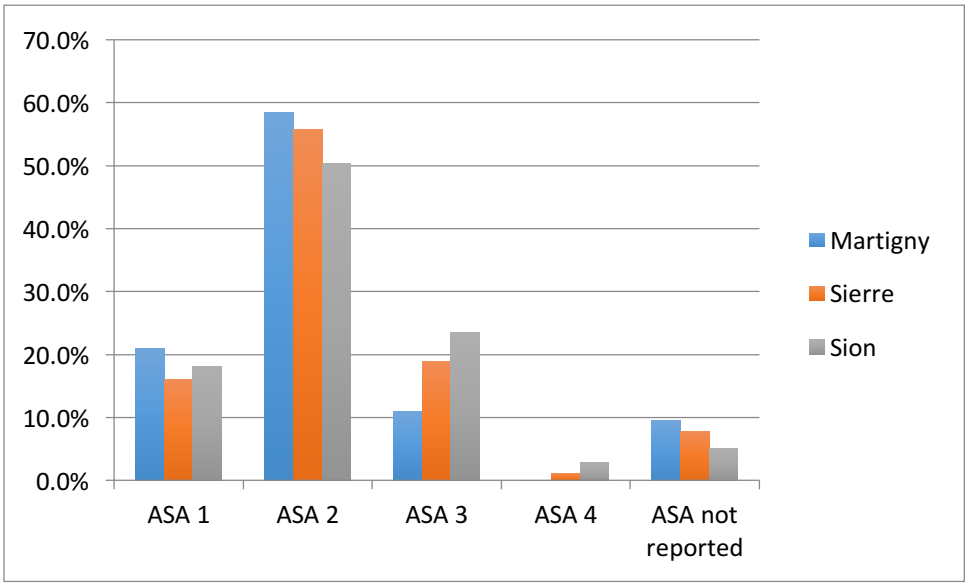


Figure 8

Elective patients with a PAV at the PAC

The proportion of all elective patients having had, or not, a preanaethesia visit at the PAC is shown in figure 9:

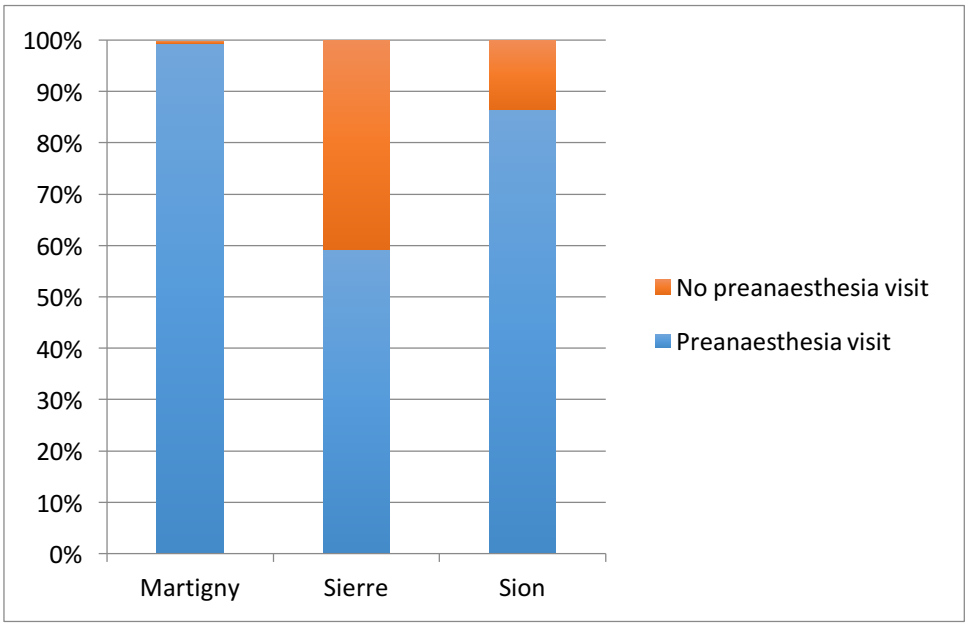


Figure 9

In Sion, 13,6% % of the elective patients are not seen at the PAV unit. On the other hand, in Martigny, only 0,6% of the patients scheduled for an elective intervention were not seen. Ain Sierre, the proportion climbs up to 41% of the total elective patients who are not seen at a PAC. Surprisingly, in elective interventions, a total of 18,3 % of patients do not benefit from a PAC prior to their intervention, from those 15,8% are ASA 3+ patients. There remains a number of undocumented ASA status cases (data missing) which could be additional ASA 3+ patients.

In order to reduce security gaps, it would be recommended to detect the ASA 3+ patients prior to the surgical intervention, whatever anesthesia technique the surgeon has chosen and whatever time frame before an intervention. A web-based questionnaire could function as a "triage at home" for these patients. As the current resources do not allow an expansion of the PAVs at the PAC, the solution could be a transfer from resources used for the evaluation of ASA 1 (healthy) patients to ASA 3+ patients. The analysis led to the assumption that a triage at home is possible in form of a VAV, the main population of patients being ASA 2. The ePAQ and algorithms were designed in this respect. On the other hand, the ASA status is not the only risk factor for perioperative mortality. That is why a second marker had to be joined. The choice of the Surgical Risk Index seemed the most close to the current practice.

ASA status of elective patients without a PAV at a PAC

The distribution of the ASA status of patients without a PAV at the PAC is shown in figure 10.

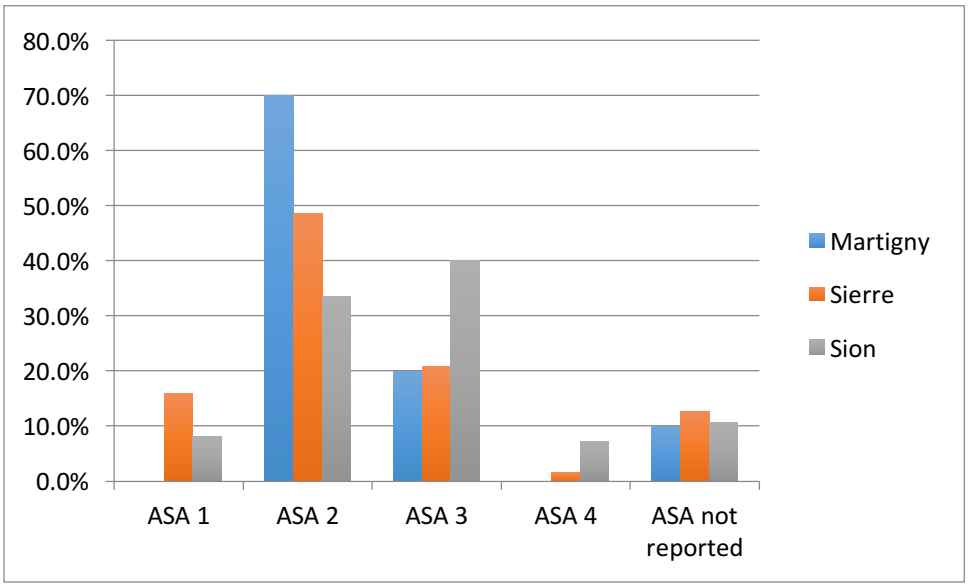


Figure 10

In Martigny, patients without a PAV at the PAC are categorized mainly as ASA 2 and 3, in Sion and Sierre all ASA categories 1 - 4 are represented.

The surprising fact comes from the ASA 4 patients - patients with a severe systemic illness which is a constant threat to life. Surgical interventions for those patients usually require the presence of at least an ICU for the postoperative follow-up and care. Such ones only exists in Sion. However, Sierre reports 1,6% of ASA 4 patients. Moreover, from these elective ASA 4 patients 44,4 % had no PAV at a PAC, but the visit is made shortly before the intervention. This can be due to the fact that the anaesthesia technique choosen by the surgeon did not require a PAV corresponding to the workflow (standby, local anaesthesia, locoregional anaesthesia of the upper extremities). Nevertheless which anaesthesia technique is choosen, these patients represent a vulnerable population who need a PAV at distance to prevent complications.

Obstetric analgesia and PAVs at a PAC

In this analysis, the statistics reported 466 obstetric analgesia acts in the CHVR, which is center with about 1700 deliveries per year. This requires a special attention. Women who are going to give birth are usually in good health; they are generally proposed an epidural analgesia, however they are usually already in labor when the analgesia is proposed. Even if they are in a good health condition, the simple fact of the pregnancy adds risks to an apparently simple analgesic procedure. It is surprising that where two human lives are concerned, no PAV is proposed in advance. Moreover a PAV during labor makes an informed consent unrealistic from a medico-legal point of view. The current opinion states that such a visit at a PAC might be too much "intervention" for a healthy condition and a normal pregnancy. Only some selected pregnant women are addressed to the PAC by their obstetrician or midwife when they have a health-related concern. Nevertheless, even healthy pregnant women represent a vulnerable population because of pregnancy related changes and hence it is worth to do a pre-birth anesthesiological assessment.

This led to the proposition of a supplementary video intended only for pregnant women, explaining the analgesic techniques, but also anesthetic techniques for an emergency cesarean delivery and the ePAQ was adapted to include pregnant women.

SUMMARY

The results of this statistical analysis underpinned the search for potential optimizations which should include the following: a standardized information prior to the PAV for all patients, especially vulnerable populations; an algorithm permitting a triage at home in order to detect patients at risk; a shift from paper documentation to documentation directly in the CIS; documentation existing also in German (or even other languages); and enough time for patient information before an elective intervention.
The use of new electronic resources seems promising, as it could ensure these criteria. The next step was the development of the virtual PAV (VAV). Decision was made to make this platform as close as possible to a standard PAV and reflect the practice at the CHVR.

RESULTS OF THE DEVELOPMENT PHASE

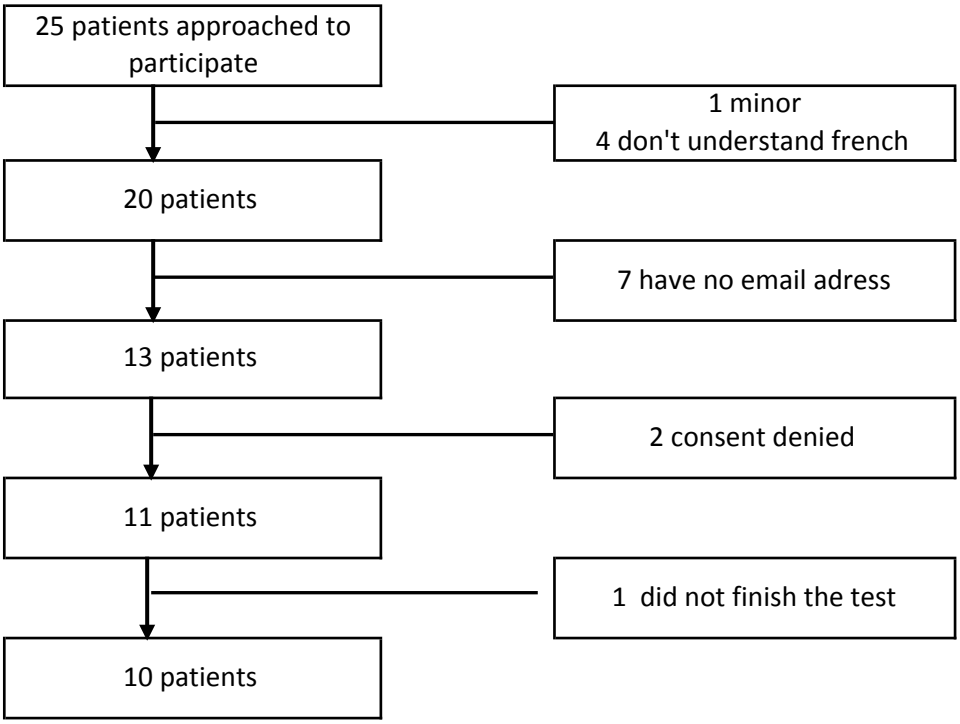
As the data exist in a virtual form of a web-page, there is no verabtim reporting possible, even though, they are the center-piece of the present thesis work.
They can be partly consulted on the attached CD, as the web page is not accesible without a scheduled surgical intervention at the CHVR.
In the appendix are present:
- the list of surgical interventions, their related risk categories and anaesthesia techniques (Excel form)
- the ePAQ (Excel form)
- the four videos which are presented to the patients according to the surgical interventions list;
- the cASA algorithm
- mock-ups of the webpage

These documents are intellectual property of the developers and the thesis author and not intended to be reused.

RESULTS OF THE EVALUATION PHASE

Test phase

As in Sierre there is no PAC, no test could be conducted in that site.
A total of 43 patients had a standard PAV at the PAC of Martigny and Sion during two and a half days, as presented in the following table:



(Table 6)

Five patients were seen at the PAC in Martigny and five in Sion. This was important in order to determine if there was a difference in the potential acceptation of the VAV at different sites and to detect if the design fits potentially the various sites and the patient's preferences. There were three male patients and seven female patients. The mean age was 51,4 years (which is in the same range as the patients studied in the statistics, 57 years), the oldest participant being 69 years and the youngest 35 years old.

The average time to complete the questionnaire and see the video was 14 minutes. One participant has seen the longest video for anesthesia for lower limbs, the other 9 patients have seen the video on general anesthesia. It seemed important to test these videos on Martigny and Sion sites. The scope was to see if there is a difference in time looking at the videos.
The following table shows the concordance of the ASA status and important informations from the VAV, such as the surgical risk category (SR), the number of red flags (RF) and yellow flags (YF), the number of not concordant cASA and eASA scores, and the mandatory admission to a PAC prior to the intervention.

Two patients completed the ePAQ, but their data were lost in the experimental phase due to informatics problems. Where the eASA status has been attributed by a trainee anesthetist, their ASA score has been reevaluated by a senior anesthetist. Only for patient 7 the senior anesthetist disagreed with the ASA status given by the trainee.
In four of the patients, the result of the VAV calculation of the cASA score was similar to the eASA status a standard anesthetist would give. In three patients, the cASA was higher than the eASA, and in one patient, the cASA was lower than the eASA score. This result are not surprising, even though the

population size is very small, as the "triage mesh" has been voluntarily planned to be tight in order to guarantee the patien's safety in an initial phase.
Following the VAV algorithm, 50% of the patients could have renounced to a PAC. The only patient where the cASA score was lower than the eASA would have been invited to a PAV due to a yellow flag. This is probably the benefit of including red and yellow flags and also the surgical risk category in the algorithm.
The patient's experience of the ePAQ was as following (for legibility purposes the boxes where 0% was indicated were deleted):

DISCUSSION

Population analysis:

The observational phase gave an insight in the basic workflows and population in the HVS and particularly at the CHVR. The three surgical sites, Martigny, Sierre and Sion, have three different ways to realize a PAV. This difference was well known, but the analysis confirmed the subjective knowledge underlying the hypothesis that the PAV should be standardized.

The distribution of surgical specialties influences the ASA status at each site and the choice of the anesthesia techniques, as also on the proportion of emergency cases and therefore the time frame at disposition before a PAV in the PAC.
The differences in the workflow are of interest as the need for a PAV is not determined primarily by the anesthesiological needs (health status for the patient, surgical risk) but by the logistical determinants fixed in a different manner on the three sites. As Sierre has no PAC, a local solution was developed. In the end, it is the surgeon who determines the appointment for a PAV through the preference for an anesthesia technique supposed to be suited for the intervention. This leads to unsatisfactory situaitons and potential conflicts, as the surgeon's view of the needed anesthesia technique does not always fit with the anethesiological view. These are "organizational" factors in Reason's Swiss Cheese Model of Human Error (8, 22) which can generate latent errors.
The fact that different information sheets are sent to the patient can also lead to unequal information of the patient.
The Recommendations of the SGAR (Schweizerische Gesellschaft für Anästhesie und Reanimation / Swiss Society of Anaesthesia and Reanimation) (23) suggest that the information should be given to the patient in a time frame which leaves sufficient time to think about the options and to make a choice. Even emergency cases require an adequate patient information and documentation of the visit.(23) At the site of Sierre, for planned interventions, this seems not the case in one out of five patients. Of course they get written information prior to the intervention, but often do not know which of the described techniques they will be proposed, and which is adequate for them. Furthermore, getting a PAV when already lying on an operating table ready to go in to the operation room does not seem to be the optimal condition for a calm discussion where the stress level does not worsen the patients cognitive capacity.

We concluded that there is room for improvement towards a standardized PAV at distance in order to "close" these "Swiss Cheese Holes" in order to limit hazards and reinforce security.
Furthermore, ambulatory diagnostic and therapeutic procedures are growing, and so do the needs for a preoperative anaesthetic assessment. In Switzerland, most institutions have implemented a mandatory PAV. Most of the informations are collected on a paper basis. Some institutions use phone calls for assessment, others use videos for patient information.
Moreover, it seems that “pre-operative assessment by anaesthetists is often not standardized, frequently incomplete, inconsistent, and time-consuming, making pre-operative information difficult to interpret. In addition, communication problems and inadequate information flow are the main causes of medical errors”.(24)
In 2015, the proportion of doctors working in Swiss hospitals with a diploma from a foreign country was 37,5%. From these, only 24% came from countries speaking the one of the Swiss national languages.(25) Communication skills are essential for the PAV. (26) A further translation of the VAV not only to German and French, but also Portuguese, Albanian, Tigrina and Sign language could be a step towards a better perioperative management of patients with language barriers.

Development of the VAV

Computer-based assessment and patient information tools have already been developed and studied.(27-32) In a recent study, Lemarie et al concluded that there was a need to use new information technologies and that video information was suited for patient information prior to an anaesthesia. (33) Edwards et al compared the use of patient information with spoken information, spoken information with a brochure and information through a website. The results showed that the information given through a website increased the patient's knowledge about anaesthesia more than in any other form of information. (34) Nahm et al studied the effects of a web-based preoperative education program and concluded that their findings "demonstrate a great potential for use of web-based programs to improve patient education in busy preoperative care areas" (32)

It appeared during the development that the VAV tool could enable a triage at home for patients with limited comorbidities (defined as < ASA 3), and limited surgical risks (defined as surgical risk 1-2). Currently, surgical and anesthetic activity is growing and expanding, notably in day-case surgery and ambulatory surgery.
In an ideal world, all patients should benefit from a PAV some time prior to their intervention. In times of limited resources, unfortunately, this is challenging. The statistical analysis shows that 18% of the patients at all sites do not have a visit at distance in elective cases for different reasons. Currently, it cannot be assured that every patient receives an appointment for a PAV at a PAC.

For security reasons, it is desirable that the choice of patients who do not have a PAV should not be decided at random or by logistical reasons, but by a choice related to the allocation of resources. These should be allocated with a priority for patients whose condition needs a thorough examination and

peroperative optimization prior to an intervention, i.e. ASA 3+ patients. Thus, it appeared that the VAV should include an algorithm permitting a "choice" of patients in good health status and with little surgery risk (see definition in the Appendix) in order to permit them to express if they feel the need of a PAV or not. The VAVplus called algorithm has a function of triage at home for patients and is the most delicate element of the VAV. Zuidema et al showed that a heterogonous ASA status could be mimicked by a cASA status computed by a preoperative assessment system with a little margin of error.(24) Goodhart et al developed and validated a new ePAQ and concluded that the ePAQ was acceptable to patients and their intrinsic scoring systems for ASA comparable with values assigned by clinicians. (30)

Test of the VAV

The development phase was delayed a first time in summer 2016 when the political authorities decided of the closing of the Infomed Project of the HVS (Dossier Patient), as this would have ensured a secured patients access. (35, 36) Another solution for the web-access and secure patient data management was searched. Other urgent informatics projects then further delayed the development. During the writing phase of the thesis the delay persisted, so that a splitting of the project was decided.
The thesis includes now the evaluation, development and test phase. The initially designed research project described in the thesis plan is currently compromised by logistical and financial obstacles.
The CHVR has decided to use the developed VAV in a first time as a simple alternative to the paper form, not using its extended form, i.e. as a triage for patients at home.

The test phase conducted in the HVS showed that patients agreed that the questionnaire helped them to communicate about their health condition, that it was relevant to their condition and easy to complete (not too long, complicated, or annoying).
Interestingly, of the 25 patients approached, 20% were excluded because of their age (under 18 years old) or language. From the 20 patients meeting the inclusion criteria, 35% had no email address. As the number of patients is not representative, there is a clear need to study if this proportion of non-VAV-eligible patients is present in a larger population, as it would limit the use of the VAV.

In many countries, the ASA score is used for quality survey purposes and for data collection on anaesthesia: it is also the case in Switzerland in the medical reporting systems. The ASA Score is also one of five predictors - along with the age, functional status, surgical risk and Creatinine level - of perioperative myocardial infarction/cardiac arrest in the 2007 developed predictive model NSQIP MICA, whose use to classsify cardiovascular risk in patients for non-cardiac surgery is a Class-I-Recommendation in the 2014 issued Guidelines from the joint European Heart Association and European Society of Anaesthesia (15). Thus, the ASA score, even if with a subjective touch, is accepted as a risk stratification tool. As seen in the test phase, yet if not conclusive, the cASA status could be accurately assigned through an informatics algorithm, but this has to be studied in a representative sample.

For the future workflow, it is proposed that the PAC collaborators at the sites of Sion and Martigny check all admission demands, and that they generate systematically a VAV for all adult patients scheduled for non-cardiac surgery, regardless of age. At Sierre it would be useful when the surgical office collaborators could generate a VAV.

Limitations

There are limitations to the project. Until now there was no reporting of a surgical risk class, therefore no retrospective comparison is possible regarding this variable.
The possible application of a VAV for pregnant women cannot be evaluated as until now, they are not invited for a PAC unless there are relevant pathologies, detected by the obstetrician or the midwife.

The VAV is influenced by a selection bias as only patients having an email address will participate. This could be an objection to the use of the VAV and moreover, to its extension to all age categories.
A study ordered by Pro Senectute Schweiz and conducted by the Institute of Gerontology (University of Zurich) showed that in Switzerland, the senior onliners (i.e. persons older than 65 years old and using internet) has grown by 47% between 2010 and 2015. In 2015, 56% of the seniors were onliners, this proportion growing to almost 80% for persons aged between 65 and 69 years, 66% for the category 70 - 74 years, 50% of the 75 - 80 years old seniors and 38% of the category 81 - 84 years. Remarkably, a little bit more than one out of ten persons older than 85 years use the internet! More than 60% of the onliners indicate that they use internet for health-related purposes. (37)
On the other side, this study doesn't make a distinction between seniors living in towns or in a rather still rural environment such as Valais, which might again influence the utility of the VAV in the CHVR.

Of notice during this preliminary phase the investigator was present next to the patients and might have influenced their assessment. The results of the test phase are not representative as the number of patients is very small. They can only serve as general indicators.

To guarantee security for all patients, we propose to introduce the VAV in parallel with the prior existing system, i.e. all adult patients scheduled for non-cardiac surgery are invited to complete a VAV online but there is no exclusion for a PAV by an cASA score until there is sufficient experimental evidence that the calculated cASA is reliable and has an acceptable sensitivity.

CONCLUSION

The foundation stone in the development of the VAV and this thesis was a constructive criticism emitted in October 2014, expressing our surprise in front of what was felt as an uneven triaging of patients on the three hospital sites, which eventually led to uncomfortable and sometimes also - in Reason's words - to hazardous situations in the operating room. Another critical point addressed was a somewhat unsatisfying workflow with unnecessary steps between paper- and computerbased work.

The study of the existing literature, a deeper look at the local workflows and the epidemiological analysis led to the conclusion that the idea of developing an online tool to assist the PAV was a realistic goal.

The development of the VAV was a creative and interdisciplinary challenge. Echoes from professional colleagues moved from scepticism to collaboration. The VAV is no longer an abstract idea, but a project supported by different departments of the CHVR. The modest test phase showed that the VAV might also be favoured by patients.

We expect now the results of the implementation of the VAV in the daily workflow and hope it will find acceptance by the colleagues and patients. Furthermore, it would be highly desirable that clinical research could reinforce it in the practice.

The literature shows that the use of videos for patient information have been studied, as also web-based preanaesthesia questionnairee. The VAV represents an innovation as it combines these two elements with risk evaluation and triage algorithms, and permits the importation of patients data into the CIS, thus representing a gain in time not only for the anaesthetist, but hopefully also for the patients. We are especially interested if the VAV will change the approach in obstetric analgesia, where it can be seen as an even more innovating tool.

We hope to have contributed to patient's security and autonomy in handling their health, which was the goal of this work. We look forward to the project inspiring even further developments.

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ANNEXES

Table 2

<table>
<tr><td></td><td colspan="2">Martigny</td><td colspan="2">Sierre</td><td colspan="2">Sion</td></tr>
<tr><td colspan="7">Admissions Department: correct identification of patient</td></tr>
<tr><td>Surgeon in hospital</td><td colspan="6">Fills in an Admission Demand (AD) in the AIS</td></tr>
<tr><td>Consultant surgeon (out of the hospital)</td><td colspan="6">Fills in an AD on a special form, which will be send by mail and examined by the PAV Units (Sion, Martigny) / announces an emergency intervention by phone call</td></tr>
<tr><td>Exam of the AD</td><td colspan="2">by PAV Unit Martigny</td><td colspan="4">by PAV Unit Sion</td></tr>
<tr><td>Criterion</td><td colspan="2">Date of the Intervention: deadline 3 weeks</td><td colspan="2">Type of Anaesthesia demanded by surgeon</td><td colspan="2">Date of Intervention: deadline 5 working days</td></tr>
<tr><td>Type of convocation by PAV Unit</td><td>> 3 weeks before : convocation through postal mail

< 3 weeks: convocation through a phone call</td><td>AD receveived through post mail, same procedure as normal AD.

Announcement of emergency procedure: appointement for PAV is given through a phone call</td><td>Local and Regional anaesthesia of upper extremity > no PAV at distance of the intervention</td><td>Regional anaesthesia inferior extremity / Neuraxial anaesthesia / General anaesthesia: appointement given for PAV in Sion</td><td>intervention > 5 working days: appointement for a PAV given by phone call</td><td>if intervention < 5 working days: no PAV at distance of the intervention</td></tr>
<tr><td>Documents</td><td colspan="2">Questionnaire and informed consent form sent by mail</td><td colspan="2">Questionnaire and informed consent form given by surgeon</td><td colspan="2">Questionnaire and informed consent form sent by mail</td></tr>
<tr><td>PAV at distance</td><td colspan="2">Every patient</td><td>PAV on arriving in the hospital / operating room</td><td>Every patient</td><td>Every patient</td><td>PAV on arriving in the hospital / operating room</td></tr>
</table>

(Table 2)

Table 7

Patient N°	Age	cASA	SR	RF	YF	eASA	Difference ASA	PAC
2	1964	2	1			1	*	no
3	1956	2	1	1	1	2		yes
4	1948	2	2			2		yes
5	1965	2	1			2		no
6		missing data						
7	1976	3	2	2		2	*	yes
8	1982	2	1			1	*	no
9	1972	2	1			2		no
10	1962	1	1		1	2		yes
11	1969	missing data						

(Table 7)

Tables 8 & 9

QQ-10 statement	Strongly disagree	Mostly disagree	Neither agree nor disagree	Mostly agree	Strongly agree
The questionnaire helped me to communicate about my condition.				11.1%	88.9%
The questionnaire was relevant to my condition.				22.2%	77.8%
The questionnaire was easy to complete.				33.3%	66.7%
The questionnaire included all the aspects of my condition that I am concerned.			11.1%	22.2%	66.7%
I enjoyed filling in the questionnaire.			11.1%	11.1%	77.8%
I would be happy to complete the questionnaire again in the future as part of my routine care.				22.2%	77.8%
The questionnaire was too long.	55.6%	33.3%	11.1%		
The questionnaire was too embarrassing.	77.8%	22.2%	11.1%		
The questionnaire was too complicated.	77.8%	22.2%			
The questionnaire upset me.	100%				

(Table 8)

The patient's appreciation of the video was as following:

Appreciation of the video	Strongly disagree	Mostly disagree	Neither agree nor disagree	Mostly agree	Stongly agree
The video corresponds to my needs of information.				11.1%	88.9%
The video enriched my knowledge.			22.2%	33.3%	44.4%
The duration of the video is appropriate.				11.1%	88.9%
The topic is presented attractively.				11.1%	88.9%
The video answered the questions I had about the anesthesia.				11.1%	88.9%
I understand how the anesthesia will be.					100%
I feel comfortable after having seen the video.			11.1%	22.2%	66.7%

(Table 9)