

# Cancellation on the Day of Surgery in an Ambulatory Setting - A Retrospective Analysis

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## Research Article

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# Abstract

**Background:** Cancellations on the day of surgery represent an important setback for patients and pose considerable drawbacks for healthcare management. Part of these cancellations are due to patients' factors. Some studies have addressed this issue in inpatient care, but scarce information is found regarding ambulatory setting. This work intended to analyse the parameters that are important in patient cancellation on the day of surgery for ambulatory surgery, with a closer analysis on those that are patient dependent, specifying those that are significant in order to anticipate which patients will be cancelled beforehand.

**Methods:** This work analysed a total of 19781 patients enrolled for elective day-case surgery in 2018, from which 1253 (6.33%) made a cancellation on their day of surgery.

**Results:** Patients residing closer to the hospital (< 10 Km) had statistically more cancellations than those residing > 10 km away ( $p < 0.05$ ). Also, patients with 65 years of age or more had a higher cancellation rate ( $p < 0.05$ ). Finally, patients without a prior pre operative medical appointment might have a higher likelihood of same day cancellation (5.8% vs 14.01%,  $p < 0.05$ ). T-test and Chi-square tests were used with a level of significance of 0.05.

**Conclusions:** We expect this work can contribute to anticipate the cancellation of a given patient, enabling quicker treatment with optimised resources.

## Background

Cancellations on the day of surgery cause a heavy burden for the patients and pose a significant setback to health systems.

Previous works have shown that cancellations on the day of surgery can be globally due to patient factors, medical factors and external factors [1-2].

Tan et al. showed that clinical parameters such as history of heart failure, advanced chronic disease or history of hip fracture were significant regarding cancellations on multivariate analysis. Also, others not clinically directed such as low economic status, history of  $\geq 4$  cancelled surgeries in the past 3 years or day period for elective surgery were also significant [3].

Ambulatory surgery has been developing in the last 20-30 years in western societies mostly, but also in developing countries [4-5]. The development of both anaesthetical and minimally invasive surgical protocols has allowed clinically more complex patients to be enrolled for outpatient care throughout a diverse range of surgical specialties [6-8].

Ambulatory surgery has been gaining an increasing role in terms of surgical relevance for the patients, since it typically does not involve hospital stays and poses a lighter burden in terms of loss of working days, allowing also important results in terms of casuistic.

Indeed, as noticed for inpatient care, the cancellations in ambulatory surgery also contribute negatively for patients and healthcare systems from a global perspective. One important feature on this matter is the cancellation due to patients' factors. The literature is however quite scarce concerning the parameters that condition patients missing a surgery appointment in the ambulatory setting. The cancellations on the day of surgery frequently limit the enrolment of a new patient waiting for surgery due to logistic and clinical constraints. In such a way, an available surgical period is lost, which might have been filled if one could anticipate with a reasonable amount of accuracy which patients might be more prone to miss surgery and beforehand notify a surrogate patient for this possibility.

The objective of this work is the analysis of the parameters that are important in patient cancellation on the day of surgery for ambulatory surgery, with a closer analysis on those that are patient dependent. For this purpose, all the patients listed for ambulatory surgery from 1 January 2018 to 31 December 2018 in our ambulatory surgery centre were collected. Available parameters based on clinical records were analysed in order to ascertain which are deemed relevant for anticipating patient cancellation on the day of surgery for the ambulatory setting.

## Methods

### ***Patients***

A retrospective study was conducted at Centro Hospitalar Universitário do Porto (CHUP) using data from 1st January to 31 December 2018 in accordance with the specifications from the local research ethics committee. All the adult patients undergoing elective day-case surgery from all the medical specialities in our ambulatory centre (n=19781) were enrolled. This included General Surgery, Vascular Surgery, Dermatology, Gynaecology, Neurosurgery, Ophthalmology, Plastic Surgery, Neuropathology, Orthopaedics, Otorhinolaryngology, Maxillofacial Surgery and Urology.

### ***Data collection and analysis***

The data was collected from digital medical records. The variables presented in Table 1 were analysed for all the patients.

**Table 1.** List of variables analysed. n.d. - not detailed.

Outcome	Surgery performed, Cancelled on the same day, Cancelled on another day
Reason for cancellation	Altered patient status, Deficiency/lack of material support, Patient already submitted to surgery, Administrative error, Lack of clinical information, Missing with a plausible justification, Missing without a plausible justification, Deceased, Need for urgent clinical rescheduling, Patient refused surgery, Patient refused surgery with a plausible justification, Patient refused surgery without a plausible justification, Unable to contact patient
Gender	Male, Female
Medical specialty	General Surgery, Vascular Surgery, Dermatology, Gynaecology, Neurosurgery, Ophthalmology, Plastic Surgery, Neuropathology, Orthopaedics, Otorhinolaryngology, Maxillofacial Surgery, Urology, Breast Surgery
County	n.d.
Distance from CHUP	< 10 Km; > 10 Km
Age	< 65 years, ≥ 65 years
Pre-op medical appointment	with, without

The Chi-square test was used with data reported as number (%) for the categorical variables presented with 95% confidence intervals. Significance was attributed at the 5% level. Data analysis was performed in SPSS Statistics vs 23.

## Results

From a total of 19781 patients enrolled for elective day-case surgery in 2018, 1253 (6.33%) made a cancellation on their day of surgery. Figure 1 presents the yearly variation in terms of cancellations (in %).

Figure 2 presents the absolute frequencies through medical speciality regarding same day cancellations. Ophthalmology presented the highest value (66,2%; n=830), followed by Maxillofacial Surgery (7,82%; n=98), Vascular Surgery (6,22%; n=78), General Surgery (6,06%; n=76) and Dermatology (4,55%; n=57). When comparing the number of enrolled patients against the number of same day cancellations, Neuropathology exhibits the highest percentage (10,86%), followed by Dermatology (8,62%) and Ophthalmology (7,59%).

Figure 3 details the motifs for cancellation on the day of surgery as registered on the patient digital clinical registry. Alteration in patient status (33,04%; n=414) missing surgery with a plausible reason (28,01%; n=351) and missing surgery without a plausible reason (20,67%; n=259) were the most prevalent reasons for same day cancellation.

Figure 4 describes the proportions of same day cancellation in terms of distance to the hospital. A cut-off of 10 Km was defined for creating the nominal variable and the group that included patients residing closer to the hospital was more prone to cancellation. The differences between the two groups were found to be statistically significant ( $p < 0.05$ ).

Figure 5 details the proportions of same day cancellation for the different age groups. A cut-off was defined above 65 years for creating the nominal variable and the group that included patients with 65 years or more presented a higher cancellation rate. These differences were also found to be statistically significant ( $p < 0.05$ ).

As for gender, the percentage of cancellation was quite balanced between both with 6.2% cancellation in males and 6.5% in females, as shown in Figure 6. No statistical significance was encountered for the differences.

Finally, regarding the existence of a pre operative medical appointment, a statistically significant difference was encountered when considering the variable "Alteration in patient status", as shown in Figure 7. Indeed, from the 414 patients with a same day cancellation only 24 had a pre operative medical appointment (5,80%). Comparatively, from the 16172 patients that were effectively enrolled and submitted to surgery, 2266 (14.01%) had a pre operative medical appointment.

## Discussion

Cancellations on the same day of surgery constitute an important drawback in terms of medical care and management of healthcare resources.

Other authors have previously addressed this issue and have categorized these cancellations into 3 groups, namely: patient derived, medical derived, external factors.

This work dedicated closer attention to patient derived cancellations on the same day of surgery in our ambulatory hospital in a 1-year time in 2018.

A set of digitally available parameters were retrospectively analysed in order to gain insight on the possible reasons that may contribute to patient derived cancellation. Additionally, this work also has the goal to anticipate and modify changeable variables in order to decrease the rate of patient cancellation in the same day of surgery.

Based on the descriptive statistical analysis, 6.33% of cancellations occurred in the total amount of patients enrolled for surgery in our ambulatory centre. This is in accordance with data present in the literature and suggests that the findings presented in this work may be valid when extrapolated to the general population [9].

No relevant yearly variation was found which suggest that no specific efforts should be seasonally dedicated in order to tackle this issue, but, on the other hand, these should be present homogeneously

throughout the year (Figure 1).

Ophthalmology showed the highest absolute value for same day cancellations, ranking 3rd when comparing the number of enrolled patients against the number of same day cancellations. Neuropathology and Dermatology were 1st and 2nd respectively. This observation might reside in the fact that these medical specialties frequently have short surgical procedures (e.g. facoemulsification in Ophthalmology or nevus excision in Dermatology) while other specialities have more time-expanded surgeries. This enables the enrolment of more patients in one operating room period by Ophthalmology, being therefore not surprising that more patients may cancel their surgery on the same day. Vascular surgery was also located in the top 25% of cancellations (ranked 3rd with 6.22% same day cancellations) which follow previously published data [3].

Regarding the motifs for patient cancellation based on the digital records, the parameter “alteration in patient status” was the most prevalent. It is reasonable to assume that such an event would be noticed in the pre-op medical appointment. When analysing through the pre op medical appointment of patients that cancelled due to “alteration in patient status”, a total of 5.8% of patients had a pre op medial appointment. Significantly more patients ( $p < 0.05$ ) which were enrolled and were subjected to surgery attended the pre operative medical appointment (14.01%). This suggests that, apart from what is already state of the art that refers that attendance at preoperative medical appointment is associated with a reduced likelihood of cancellation, patients without a prior pre operative medical appointment despite the motif, might have a higher likelihood of same day cancellation in ambulatory surgery [10-12].

The analysis of cancellations considering distance to the hospital revealed that patients residing closer to the hospital ( $< 10$  Km) had statistically more cancellations than those residing  $> 10$  km away ( $p < 0.05$ ). This might be because patients residing closer to the hospital have quicker geographical access to the hospital facilities and rescheduling of medical appointments. This may predispose the patients to be less reluctant in cancelling/postponing a surgical procedure. Patients residing in areas that are more distant may be more hesitant to postpone the procedure.

Cancellations considering the age parameter showed patients with 65 years of age or more had a higher cancellation rate ( $p < 0.05$ ). Indeed, patients of older age groups commonly have more pathologies, increased limitations and constraints in individual locomotion. These factors may hinder the adequate completion of the process towards surgical treatment.

As for gender comparison, no statistically significant difference was found between both groups in relative proportion of cancellations.

This study has inherent limitations. It is limited to a single institution (one of the major central hospitals in Portugal providing tertiary care) in the year 2018.

Another limitation is the partial availability of parameters from patients to be obtained retrospectively. Although all the digitally available variables were gathered, these provide only partial information on the

motifs for cancellation by the patients. Indeed, patients' motifs for cancellation are not entirely objective with this dataset. Nonetheless, this information is valuable as a preliminary assessment towards the optimization of the healthcare system with the possible creation of algorithms to anticipate the cancellation of a given patient and her/his replacement by a surrogate patient for surgery.

Future investigations could focus on the definition of a typical profile of a patient that cancels surgery on the same day based on its specific variables. A predictive tool to identify with sufficient accuracy those with a higher likelihood of cancellation on the same day could be put forth, enabling the enrolment of a substitute in case of effective cancellation. Such an approach might allow quicker treatment for patients with associated optimization of healthcare resources.

## Conclusion

This work showed that patients located closer to the hospital facilities and of older age groups ( $\geq 65$  years) are more likely to cancel or be cancelled ( $p < 0.05$ ). Based on this preliminary evaluation, further studies can be planned in order to ascertain which variables, namely patient related, can be depicted in order to define a patient profile with higher likelihood of cancellation on the same day of ambulatory surgery. This may allow for a surrogate patient that is already enrolled and waiting for surgery, to be pre booked in advance, thereby permitting quicker treatment without loss of operative time.

## Declarations

**Ethics approval and consent to participate:** All protocols were carried out in accordance with relevant guidelines and regulations and were approved by the institutional Ethical Committee (Ethical Committee of the Centro Hospitalar Universitário do Porto (CHUP)/Instituto de Ciências Biomédicas Abel Salazar of the University of Porto (ICBAS-UP); Clinical Research Department of CHUP; Department of Education, Training, and Research (DEFI), in accordance with the Declaration of Helsinki. Given the retrospective nature of the study, the institutional Ethical Committee ((Ethical Committee of the Centro Hospitalar Universitário do Porto (CHUP)/Instituto de Ciências Biomédicas Abel Salazar of the University of Porto (ICBAS-UP); Clinical Research Department of CHUP; Department of Education, Training, and Research (DEFI) waived the need for informed consent from each of the individual participants. A signed and dated declaration of the official approval by the institutional Ethical Committee is available for consultation, if required.

**Consent for publication:** Not applicable.

**Availability of data and materials:** The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

**Competing interests:** The authors declare that they have no competing interests.

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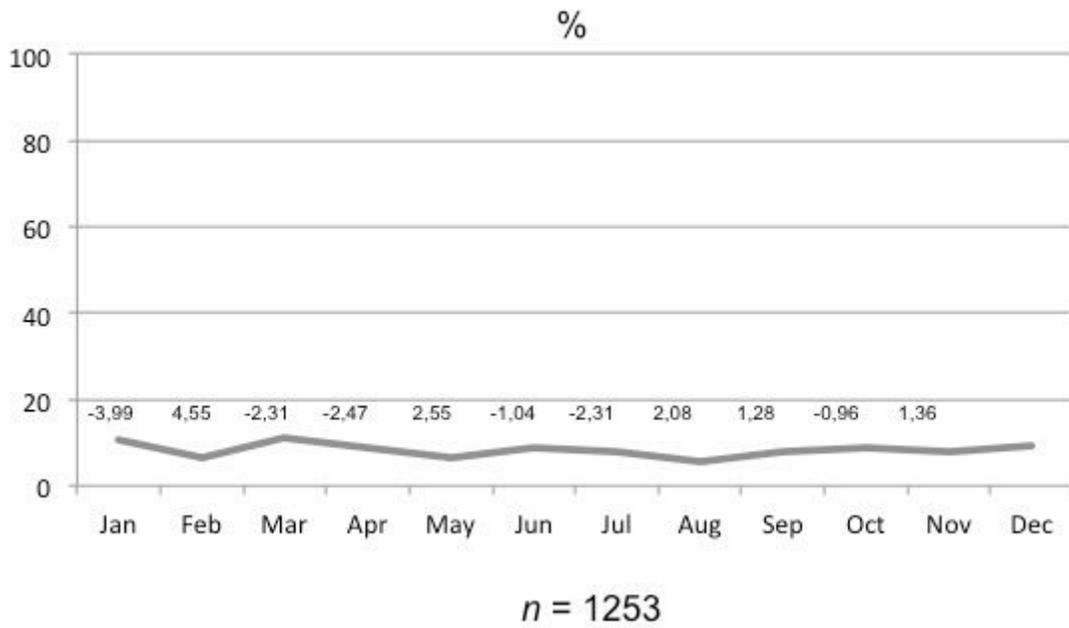
**Authors' contributions:** JTO collected and interpreted the patient data, performed the bibliographic reserach and wrote the manuscript texto; MG collected the data, CF collected the data, AP defined the study design, interpreted the patient data and revised the manuscript, ECA defined the study design and revised the manuscript. All authors read and approved the final manuscript.

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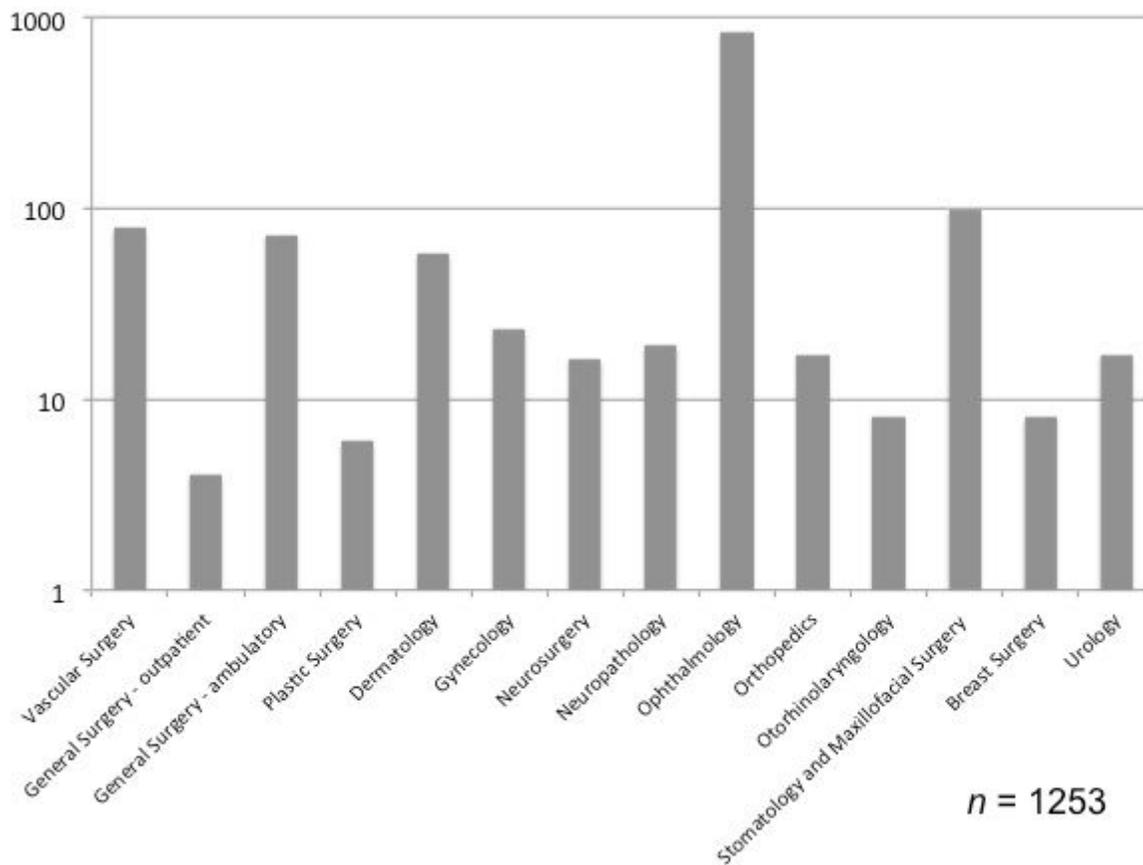
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## Figures



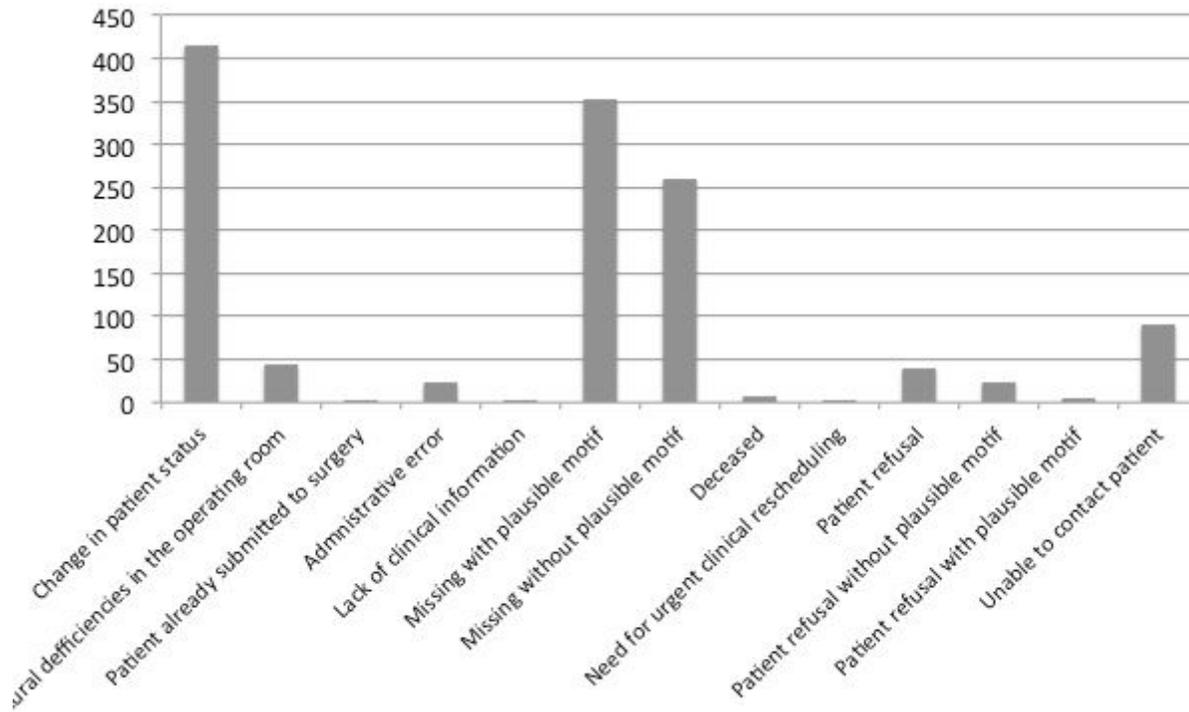
**Figure 1**

Yearly variation in terms of cancellations (%).



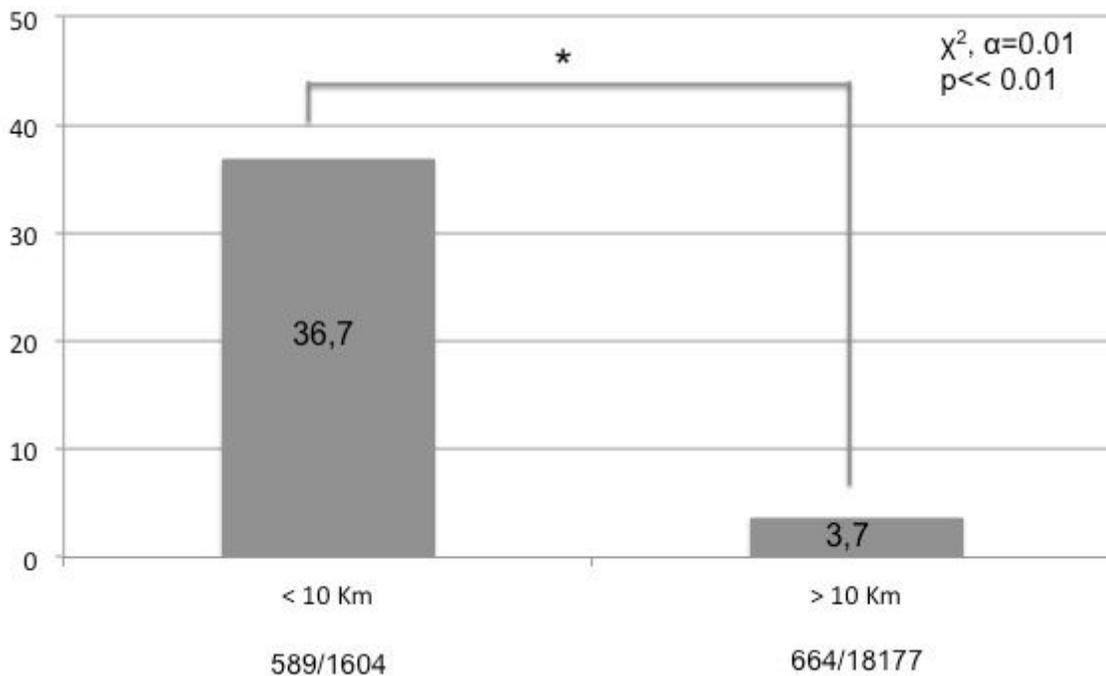
**Figure 2**

Absolute frequencies through the different medical specialties regarding same day cancellations.



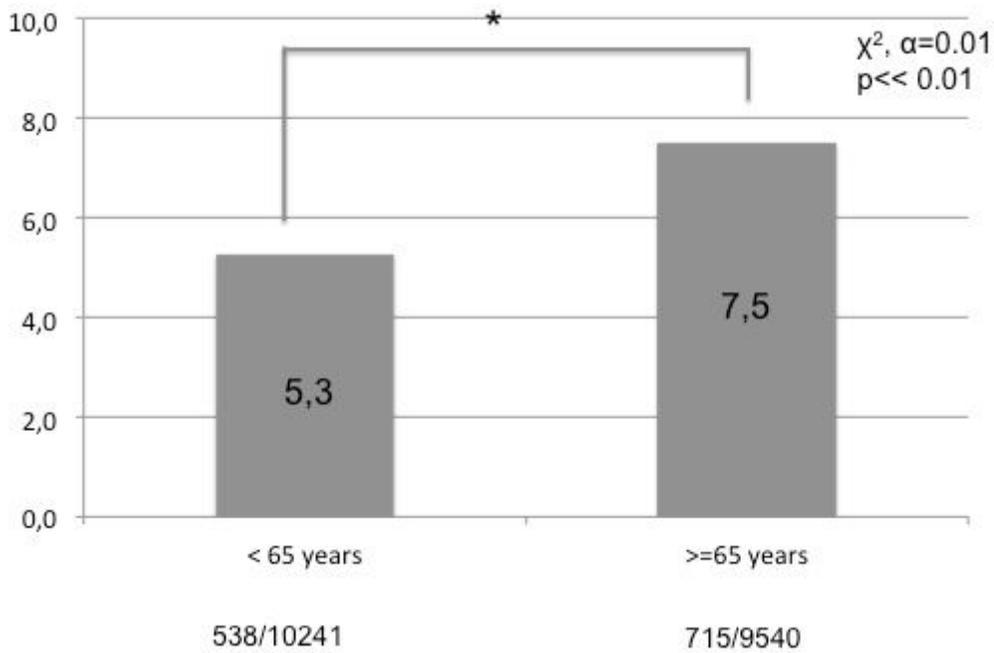
**Figure 3**

Motifs for cancellation on the day of surgery.



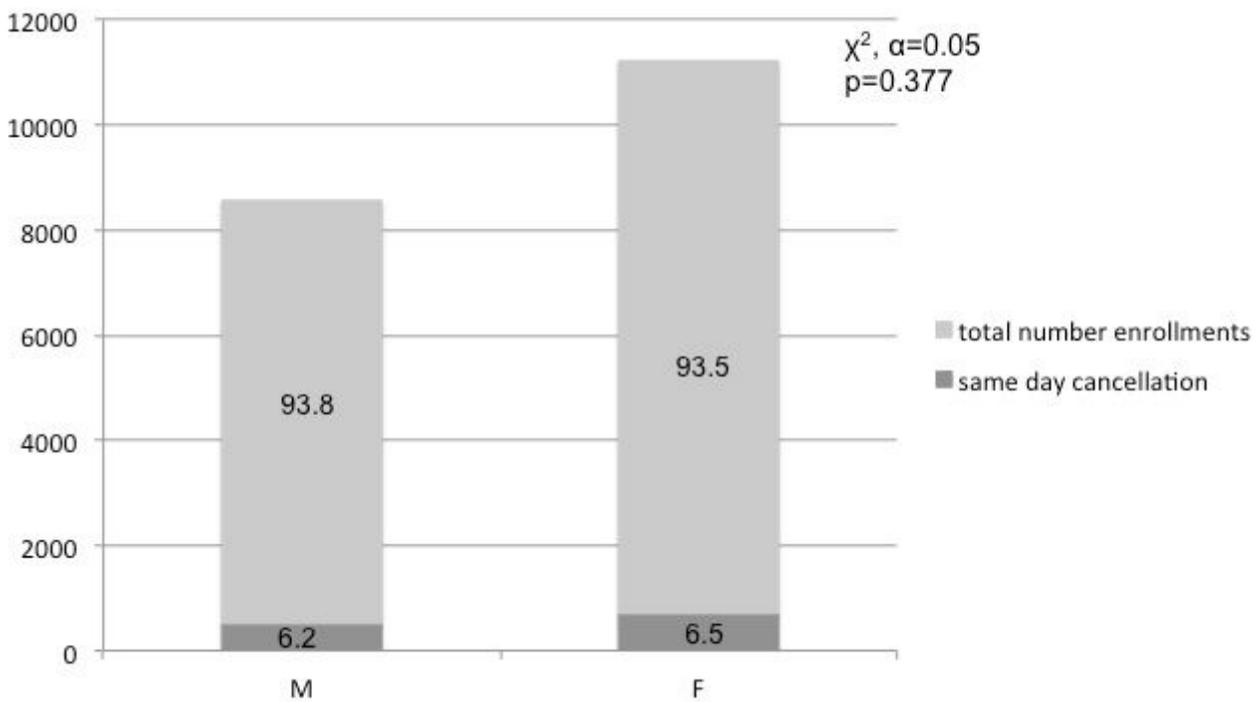
**Figure 4**

Same day cancellations in regards to the number of enrolled patients considering the distance to the hospital.



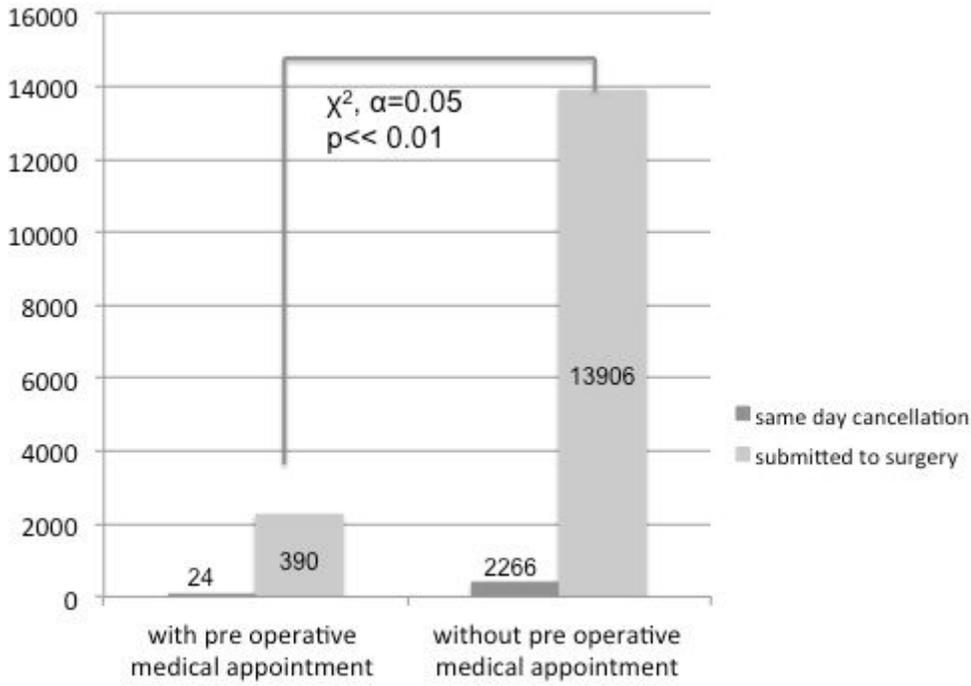
**Figure 5**

Same day cancellations in regards to the number of enrolled patients considering age.



**Figure 6**

Same day cancellations in regards to the number of enrolled patients considering gender.



**Figure 7**

Same day cancellations with and without a pre operative medical appointment when considering the variable "Alteration in patient status".