Quality of Service and Health Related Quality of Life (HRQoL) of patients undergoing cataract surgery in Dept. of Ophthalmology, University Hospital of Evros, Greece.

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I hereby declare that the work submitted is mine and that where I have made use of another’s work; I have attributed the source(s) according to the Regulations set in the Student’s Handbook.

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December 2017
Thessaloniki - Greece
Abstract

This dissertation was written as part of the MSc in Strategic Product Design at the International Hellenic University.

In today’s customer-driven market, patient as a health care customer, is changing and demands high quality by the healthcare service providers. This research was carried out in the Department of Ophthalmology (University Eye Clinic: UEC), in University Hospital of Evrou, and specifically for the service of a cataract surgery. The research was conveyed through observation, interviews and the use of a questionnaire after profound literature review.

The objective of this research was to present the service design of a cataract surgery in the UEC using managerial tools such as flowchart, blueprint and personas, assess the process through performance metrics and recommend corrective actions in order to increase the quality of the service provided, especially in the context of a quality management tool, the ISO 9001:2015 standard.

The analysis focuses also in the cost and reimbursement fees of a cataract surgery, and in the comparison of costs and reimbursements within Greece, Europe and USA, both for public and private sector.

Cataract impacts the Health-related quality of life (HRQoL) of patients, therefore a psychometric questionnaire the EQ-5D-5L was used in order to recognize how cataract surgery affects the quality of patients’ life post operative. Data analysis and discussion highlight the increase in health state and status of patients after a cataract surgery.

The quality in health services has two directions, one that applies on the quality during the process through which the service is provided and the second one that is about the medical outcome of the treatment. These two dimensions on quality are at the center of this research, which research approaches the cataract patients in UEC, tracks down their journey starting from the appointment until the surgery and follow them after the surgery to answer the question whether or not their quality of life had increased.
Acknowledgements

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Closing, I would like to thank all my professors and the rest employees of International Hellenic University, for this wonderful journey that broaden further my horizons.

Keywords:
Service design, EQ-5D-5L questionnaire, health sector, cataract surgery, quality of life

Aikaterini Paparnaki
12th December 2017
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To my dearest daughter, Electra
To my dearest husband, Evangelo
And to my parents and sister

“And now here is my secret, a very simple secret: It is only with the heart that one can see rightly; what is essential is invisible to the eye.”

Antoine de Saint-Exupéry, The Little Prince
Introduction

Quality has been used mainly by the manufacturing companies until the 2000s and has emerged as a managerial imperative for service industries just at the begging of the new millennium (Ramanujam, 2011). Service industries are adopting various quality control measures like statistical quality control, that have been traditionally used by manufacturing companies, for eliminating risks in the stages of the service process.

Service quality is the delivery of excellent or superior service relative to customer expectations. Quality is also gaining new dimensions due to the fact that concepts of quality of life (QOL), quality enhancement, quality assurance, quality level and total quality management are currently having significant impact on human services like health and education.

Quality in health care services is at the centre of professional and managerial focus because it is considered as the means to achieve competitive advantage and long-term profitability as well as achieve the suitable health outcomes for consumers (Purcărea, Gheorghe and Petrescu, 2013).

Health-related quality of life (HRQoL) is a multi-dimensional concept that includes sectors related to physical, mental, emotional, and social functioning. It is not only a direct measure of population health, life expectancy, and causes of death, but it also focuses on the impact health status has on quality of life. A related concept of HRQoL is well-being, which assesses the positive aspects of a person’s life, such as positive emotions and life satisfaction (ODPHP Office of Disease Prevention and Health Promotion, 2017).

Medical, policy, social and individual attention should be given to the management of eye diseases and improvement of HRQoL. Longitudinal studies could be performed to monitor changes in HRQoL and to permit evaluation of the outcomes of eye disease intervention programs (Tan et al., 2013).

In ophthalmology, cataract surgery is a routine intervention, the demand for which is expected to strongly increase as the population is ageing. Cataract can lead to
many difficulties in daily life, such as trouble driving, problems seeing at night, loss of vision, and generally on the Health-related quality of life (HRQoL) (Hahn and Krummenauer, 2017).

As cataract is a leading cause of blindness globally accounting for 33% of blindness worldwide and since cataract surgery is recognized as the most effective approach to prevent blindness from cataract worldwide it is important to evaluate the cost of this treatment approach as it implies high economic expenditure (Prokofyeva et al, 2013).

In health economic evaluations, the outcome of a medical intervention is associated with the cost parameter to create a basis for higher-level allocation decisions under limited financial resources. Utility in the cost-utility analysis is quantified based on the concept of health-related quality of life (HRQoL). According to Hahn and Krummenauer there is a favorable cost-utility ratio for cataract surgery in the literature. Based on the finding, cataract surgery belongs to the medical interventions that should be included in state-provided or statutory healthcare systems (Hahn and Krummenauer, 2017).

The scope of this research is to focus on both aspects of quality in health care services: the quality of the service design and the health related quality of life of the patient of UEC, after the cataract surgery. The bilateral aspects of the quality will be presented through managerial tools and psychometric questionnaire EQ-5D-5L. Data about the cost and reimbursement fees of the cataract are being presented for Greece and other European countries and also for USA. The findings of index value of the health state of the patients, enables the calculation of the utility of cataract surgery in Greece that can be used in the future in cost-utility analysis.

**Contribution**

This research aspires to contribute to the body of knowledge in health care services and provide health care providers with valuable information about the effect of cataract surgery in the patient’s quality of life.

Based on the literature review, several researches have been assessed the quality of life after a cataract surgery and the quality of service in eye clinic in the
world. However, a similar research using Greek data has not yet conveyed. This thesis uses Greek data for analysis these issues.

In addition, another new element that this research attempt is believed to add to the scientific community, is that it combines quality elements of service and health. It places the patient at the centre of the whole service process. Through a holistic approach, the health care services are not assessed only by the clinical and medical outcome that should be undoubtedly of high quality, but also by the quality of the process and service design.

In future, “soft” HRQOL data (based on EQ-5D) might be included in the preoperative evaluation as well as more old-fashioned “hard” medical data. The assessment of the improvement in HRQOL that is obtained through the specific health intervention investigated could help health care providers to better allocate resources.

**Research Questions**

Closing, and based on the literature analysis that highlighted the importance of the issues that this study tries to approach, the research questions of this study are as following:

Recognize the service design and the service quality concerning a cataract surgery in UEC, the utilization of department resources, and suggesting recommendations for improvement.

Compare the cost of cataract surgery and reimbursement fees within European countries, USA and Greece both in public and in private sector

Discuss the effect of cataract surgery on HRQoL on the sample, and the relationship between patient’s perceptions about HRQoL and the change of vision specific medical data (vision on operated eye).

**Structure of research**

The research begins with the Introduction (Chapter 1), then there is the Literature review (Chapter 2) and proceeds with describing the Methodology (Chapter 3) that was followed. Discussion and data analysis are divided into two parts as following:
Part 1: Service Design and Service Quality

In this Chapter 4 there will be a description of Dept. of Ophthalmology (University Eye Clinic, UEC), in University General Hospital of Evrou, Greece and a SWOT analysis. Then, a detailed analysis of the service design and processes provided will be focused on a patient’s journey that has diagnosed with cataract and eventually has a cataract surgery. The analysis will be based on the business processing tools such as flowcharts, blueprints, personas, poka yokes.

The Chapter 5 will be focused on suggestions and recommendations on service process improvements in the context of the imminent implementation of ISO 9001:2015 (International Standardization Organization) in the Dept. of Ophthalmology.

In the next Chapter 6 will be a presentation and a comparison of the cost of the cataract surgery and of the reimbursement fees in Greece, other European countries and USA, both in public and private sector.

Part 2: Health related Quality of life

In Chapter 7, there are the results and conclusions of the statistical analysis of the EQ-5D-5L questionnaire, results about the Health Related Quality of Life (HRQOL), and the relationship between the patient’s perceptions based on HRQOL and visual specific medical data (vision) of patients, pre and post operative. The correlation among variables will highlight whether the cataract surgery affects the patient’s quality of life and which factors are affected more.

Final conclusions upon the research are being discussed in Chapter 8 where the discussion is about the quality of service design and the quality of health related quality of life of cataract patients and how these two aspects of quality could lead to a holistic disease management.
LITERATURE REVIEW

The important question is whether or not healthcare providers should focus on their service design and in the improvement of the process through which the health care services are provided. How important is for the patient not only to have the proper treatment but also to experience a wasteful and efficient pathway to reach this service?

The factors that affect patient’s satisfaction is not only objective professional expertise but also more subjective factors such as personal communication during service, humanitarian approach and ethical values of the hospital personnel. Studies reveal that patients define healthcare quality in terms of the five dimensions of reliability, responsiveness, assurance, empathy and tangibles (Ramanujam, 2011).

Healthcare is a growing sector which has received a lot of attention from investigators and doctors worldwide. Due to the competition that exists between public and private sector a lot of consideration is required to overcome potential deficiencies and increase the quality (Kalaja, Myshketa and Scalera, 2016). The degree to which healthcare services increase the likelihood of desired health outcomes and are consistent with current professional knowledge illustrates the level of the quality of services provided.

Health services research focuses on the evaluation of the process by which healthcare is provided. Process issues include access to care and use of services and how such factors may differ for specific populations. Researchers have also included patient-centered outcomes such as performance measures (reading speed, mobility) and quality-of-life indicators. Specifically, ophthalmology was one of the first areas to develop instruments in order to quantify disease-specific quality of life. Quality-of-life outcomes are also included commonly in major clinical trials such as the Collaborative Initial Glaucoma Treatment Study (Muir, Bosworth and Lee, 2010).

The impact of health services research could result in reducing health disparities, provide public policy with valuable information and data and help in the development and evaluation of guidelines and protocols (Muir, Bosworth and Lee, 2010).
The Royal College of Ophthalmologists in the UK, is publishing and reviewing every two years, an overview for the Ophthalmic Services Guidance about the Quality, safety and clinical governance in ophthalmology. The aim of this document is to provide a simple overview of the principles and systems which currently exist in the UK for quality and safety (Q&S). They define as “clinical governance” the process of continuous improvement of the service quality and maintenance of high quality standards. There are three terms that define the high quality: Clinical effectiveness, patient safety and patient experience (The Royal College of Ophthalmologists, 2016).

Another field of health care research is the cost of each treatment and disease. The cost of care from the perspective of the patient, provider, or society is also an outcome in health services research (Muir, Bosworth and Lee, 2010). The majority of health care organizations already recognize that quality should be assessed for sustainability. Factors such as new incentive structures, declining reimbursement and increasing competition are pressuring health care organizations towards delivering health care more efficiently and effectively. Moreover, health care managers aim to decrease operating costs, expand access and improve service quality (Purcărea, Gheorghe and Petrescu, 2013).

The economic costs of specific interventions are compared with the health outcomes and this analysis facilitates economic evaluations that can be used as a basis for decision making of which procedures and medication will be provided by the national healthcare systems. There are two approaches regarding the health economic evaluation: the cost utility analysis and the cost effectiveness analysis. In contrast to cost-effectiveness studies that use measurable outcome parameters, cost-utility analyses use the dimensionless utility as the outcome parameter. Utility in the cost-utility analysis is quantified based on the concept of health-related quality of life (HRQoL) (Hahn and Krummenauer, 2017).

Globally, cataracts are the single most important cause of blindness with almost 18 million people estimated to be bilaterally blind from cataract; representing almost half of all causes of blindness due to eye diseases worldwide. Patients that suffer from cataract may experience a range of visual deficits such as deterioration in visual acuity, loss of contrast sensitivity that could lead to a range of difficulties in their daily life. One of the most cost-effective medical interventions has been shown to be
Cataract surgery is highly effective in the improvement of visual impairment (Lamourex et al, 2011).

In ophthalmology, a variety of validated survey instruments are used, reducing some obstacles and being more specific and easier to implement. There are over 100 instruments of Patient Reported Outcomes (PROs) that assess the patient’s perception generic health, vision-related functioning and vision-specific quality of life (VSQoL) which major differ from each other. The most commonly used are the short-form (SF)-12 and SF-36, Visual Functioning Index-14 (VF-14) that are instruments with vision-specific parameters. A phymetric instrument that assesses the generic health quality without vision-specific parameters is the EQ-5D. In studies that used this questionnaire, the quality of life of cataract patients has improved after the surgery (Lamourex et al, 2011).

Disease-specific instruments have shown significant gains in measuring health-related quality of life (HRQoL) in subjects having cataract surgery. However, the usage of generic instruments has resulted in conflicting evidence though favorable for patients’ health-related quality of life. The cataract patients’ daily activities such as reading newspapers or books, driving, watching TV, cooking etc, and in vision-related quality of life (QoL) improved after surgery. In addition to typical areas of functioning, cataract surgery also improves several psychosocial aspects including social interaction, mental and emotional well being, anxiety and depression as it has been shown by disease-specific instruments. (Lamourex et al, 2011).

However, the usage of generic instruments for health-related quality of life (HRQoL) assessment is also necessary in order to compare outcomes after cataract surgery with other procedures and health conditions from other medical specialties. Studies that have used generic instruments for HRQoL assessment have yielded inconsistent results in cataract subjects (Porela-Tiihonen et al., 2015). Since psychometric instruments are easier to implement, more original studies are available using these instruments, particularly the EQ-5D.

Some studies try to transfer the outcomes between indication-specific and general instruments. There have been a correlation between EQ-5D and VF-14 in an Asian population (Hahn and Krummenauer, 2017).
On a review about the studies investigating the ability of the EQ-5D, and other psychometric tests such as HUI3, and SF-6D, to reflect the effects of visual impairment on Health-Related Quality of Life (HRQoL), in patients with visual disorders, including cataract, seven were found to be published (in English language) and the results about the overall performance of EQ-5D were mixed (Tosh et al., 2012). However, the version of EQ-5D that was reviewed was the previous one with the three levels of possible answers (EQ-5D-3L) that limited the flexibility of answers. The new version of EQ-5D the EQ-5D-5L with five possible answers is believed to tack better the differences in utility between people with milder severities of visual impairment (Tosh et al., 2012).

Cataract surgery-induced improvements in visual acuity are translated by considerable gains in real life activities, emotional and social life components. Regardless of the instrument utilized, the conclusion is that cataract surgery undoubtedly improves vision-specific functioning and several aspects of vision specific quality of life. The benefit of cataract surgery, however, on generic health is less clear, due to limited vision-related factors (Lamoureux et al., 2011).

Based on the previous review of the literature, it is realized that the experience of the patient throughout the health care system is a very important bond in the chain of delivering a high quality service. In addition, the Health related Quality of Life also plays an important role in the quality of service and the design of treatment management. Furthermore, the cost analysis of medical procedures set the basis for economic evaluation analysis that could be used by the health providers.
METHODOLOGY

As it has been already described, the research is divided in two main parts that connect to each other:

1. Service Design and Service Quality
2. Health Related Quality of Life (HRQoL) assessed with EQ-5D-5L.

1st Part: Service Design and Service Quality

For the first part interviews with the Head of the UCE and the department’s stuff, medical and administrative, concerning the service process so as literature have been used to assess the service quality and recommend corrective actions. As the author is cooperating with the UEC as an external administrative staff, observation and personal experience was also used. However, there was an attempt to present information with objectivity without any subjective point of view.

In detail, the presentation of UEC was based on a description of its departments and resources and a SWOT analysis where strengths, weaknesses, opportunities and threats were recognized.

For the presentation of the services that are being provided by the UEC, certain service design tools were used as follows:

- **Flower of service**, that describes all the services provided by the department (core, facilitators and differentiators)
- **Flowchart**, that illustrates the steps of the procedure through which the service of a cataract surgery is provided
- **Personas**, that represent fictional cataract patients, a man and a woman, that their profile and interests could provide valuable information for the design of the service
- **Blueprint**, that presents in detail all the steps through which a cataract patient follows, starting from the appointment until the surgery. This approach recognizes the problematic areas in the process, the waiting and failing points that could be prevented and mitigated.

After the presentation and analysis of the services, there is an assessment of the efficiency and utilization of resources with the use of managerial performance
metrics (throughput efficiency, value-added time, bed utilization). Afterwards, and based on the previous analysis, suggestions for improvement are being proposed, mainly through the ISO 9001:2015 standard for quality management.

2nd Part: Health Related Quality of Life (HRQoL)

In the second part, the psychometric questionnaire EQ-5D-5L was used. The EQ-5D-5L instrument is a standardized measure of health status developed by the EuroQol Group in order to provide a simple, generic measure of health for clinical and economic appraisal. It is applicable to a wide range of health conditions and treatments; it provides a simple descriptive profile and a single index value for health status that can be used in the (EuroQuol Research Foundation, 2015).

A prospective follow-up study of patients that undergone cataract surgery with the phacoemulsification technique and intraocular lens implantation in either one eye or in the second eye, in UEC was attempted. The population was 100 (n=100) patients men and women of all ages (between 50-88 years old) that had cataract surgery in one eye, in UEC during September and October 2017. The patients have been randomly chosen. Patients were interviewed via telephone by the interview version in Greek language, of EQ-5D-5L. In addition, visual specific data were collected from the patients’ medical record (vision) and were analyzed in relation to the EQ-5D-5L results.

Some patients have a better vision the day after cataract surgery. Other patients’ vision increase a few days after surgery, and still others may need a full month to reach their maximum vision improvement (Visionaware.org, 2017). Therefore the post-operative interview was made one month after the surgery in order to have more reliable results. The questionnaire was administered at 2 scheduled visits, one before the surgery (pre-operative) and one month after the surgery (post-operative).

The questionnaire was given to the patients at their first visit when they have been diagnosed with cataract and a surgery was scheduled with the surgeon. The first telephone interview was made one week before the cataract surgery and the second

\[1\ \text{See Appendix A1 for the questionnaire}\]
one was made one month after the cataract surgery. All of the 100 patients answered the questions so the sample that was used was n=100 patients.

The EQ-5D-5L consists of 3 pages – the instructions (page 1), the EQ-5D-5L descriptive system (page 2) and the EQ Visual Analogue scale (EQ VAS) (page 3). The descriptive system comprises the same 5 dimensions (mobility, self care, usual activities, pain/discomfort, anxiety/depression) and each dimension has 5 levels: no problems, slight problems, moderate problems, severe problems, and extreme problems. The respondent is asked to indicate his/her health state by ticking (or placing a cross) in the box against the most appropriate statement in each of the 5 dimensions. This decision results in a 1-digit number expressing the level selected for that dimension. The digits for 5 dimensions can be combined in a 5-digit number describing the respondent’s health state. It should be noted that the numerals 1-5 have no arithmetic properties and should not be used as a cardinal score. The EQ VAS records the respondent’s self-rated health on a 20 cm vertical, visual analogue scale with endpoints labeled ‘the best health you can imagine’ and ‘the worst health you can imagine’. This information can be used as a quantitative measure of health as judged by the individual respondents.

EQ-5D-5L health states, defined by the EQ-5D-5L descriptive system, may be converted into a single index value (EuroQuol Research Foundation, 2015). There are two methods for defining the index value:

- Interim scoring by means of the crosswalk;
- Applying directly elicited value sets.

There are studies that directly elicit preferences from general population samples to derive value sets for the EQ-5D-5L however, these studies will take time to complete and for results to be disseminated. In the interim, the index value could be calculated based on the interim “crosswalk” between the EQ-5D-3L value sets and the new EQ-5D-5L descriptive system,

For the purposes of this thesis, the “Crosswalk Index Value Calculator” has been used and in the absence of a country specific value set the EuroQol Research
Foundation recommended to apply the value set of a nearby / similar country or the most frequently used value set (UK).

For analyzing the data two software programs were used:

1. The Microsoft Office Excel XP and
2. The Medcalc statistical program (version 9.6.2.0; MedCalc Software, Mariakerke, Belgium).

For the analysis and presentation of the data the EQ-5D-5L UserGuide 2015 was also used (EuroQuol Research Foundation, 2015)

Specifically, T-test was used to identify which variables had a probability (P) level lower than 0.05 (P<0.05) and are statistically significant. That means that these variables have statistically significant changed after the surgery, and therefore conclusions about which variables are changed to which direction (positive or negative) can be drawn.

For correlation analysis of the variables two tests were used: The chi-squared test and the spearman correlation analysis. The Chi-Square test is used to determine whether there is a significant relationship between two nominal (categorical) variables from a single population. It is used to determine whether there is a significant association between two variables (StatisticsSolutions, 2017).

The chi squared test was used to define the relationship between the change in patients vision (3 levels were used; 1: increase, 2: decrease, 3: same) and

- Change in self-rated health state (EQ-VAS values) pre and post operative
- Change in index value pre and post operative

The Spearman rank correlation coefficient analysis was applied to the differences of the variables before and after treatment and the relationships of the statistically significant variables are presented.

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2 See Appendix A2 for e-mail from Gerben Bakker, User support Officer, EuroQol Research Foundation, 8 Nov.2017
Service Design and Service Quality

In this chapter there is a description of the UEC and its resources, and a presentation of the service design in the case of a cataract surgery.

Description of UEC

The “Public Hospital of Alexandroupolis” was founded in 1939 in the centre of the city. In 1988, it was merged with the Medical School of Democritus University of Thrace, and since 2002 the hospital is called “University Hospital of Evrou” and is located in the western of Alexandroupolis, outside the city. The overall capacity of the hospital is 673 beds (PGNA, 2017).

The Department of Ophthalmology (University Eye Clinic: UEC) of the Democritus University of Thrace (D.U.TH), was established to the new University Hospital of Alexandroupolis in December of 2002, and it offers teaching, research and clinical services in the fields of eye pathology and surgery. Prof. Kozobolis Vassilios is the head of the Department. He founded the Eye Bank and Corneal Transplantation Center and Eye Institute of Thrace.

In the UEC, basic, clinical and epidemiological research activities are performed in order to offer theoretical and clinical teaching in the field of ophthalmology, in medical students of the D.U.TH, medical residents in the University Hospital and doctoral students, while there is close cooperation with other clinics and laboratories in Greece and other countries.

The mission of the UEC, as expressed by the head, is to expand human knowledge in Ophthalmology and Visual Sciences in general, and benefit society through research integrated with education. They investigate the most challenging, fundamental problems in science and technology in a singularly collegial, interdisciplinary atmosphere, while educating outstanding students to become creative members of society.
**Human recourses and responsibilities**

There are two academic staff, one Professor of Ophthalmology that he is also the head of the dept. and one Associate Professor of Ophthalmology.

There are three consultant ophthalmologists that examine patients in the outpatients and can surgery them. Therefore there are five surgeons in the department, including the two professors.

There are four resident ophthalmologists. One of them is placed in the surgery, the other two in outpatients and last one in the clinic. Also there are five PhD students that conduct research.

Concerning the supportive staff, there is one nurse at outpatients. At the clinic, there are three nurses and one chief nurse at the morning shift, two nurses at the evening shift and two nurses at the night shift. The nursing staff in clinic is also responsible for cardio surgery department which is at the same ward. There is also one bearer that transfers the patients form the clinic to the surgery room. In the surgery room, there is one chief nurse for all of the surgeries of the hospital, and two nurses for ophthalmic surgeries.

The chief nurse in the surgery is responsible to forward the requests for supplies and service that receives from the head of the UEC to the relative office in the hospital. A committee of staff of the UEC, proposes the requirements for the supplies, according to the relative supply law and then the supply office of the hospital is responsible to follow the appropriate procedure for the supplies of all departments, including the UEC.

**Capacity**

The UEC, is places in the second floor of the Surgery ward of the hospital. There are four rooms in the clinic which contain seventeen (17) beds. Three full examination rooms are established in the outpatients department, in the ground floor. Each one is equipped with equipment for the examination of the patients.

The number of programmed surgeries is approximately ten (10) daily and they are performed from Monday to Thursday, while eight (8) of them usually concern cataract surgery. Therefore, there are 32 cataract surgeries per month that is 320 per year (considering 10 months per year, excluding holidays).
Departments

There are the following departments that are equipped with the relative equipment in the UEC:
1. Outpatients
2. Cornea and Transplantation
3. Cataract Surgery
4. Glaucoma- Visual Field
5. Fundus Pathology
6. Argon- Yag Laser
7. Paediatric Ophthalmology- Strabismus
8. Ocular Ultrasound
9. Oculoplastic Surgery
10. Refractive Surgery

In the following Table 1, there is some information for the flow of patients in the UEC, annually:

Table 1: Statistical data of the UEC

<table>
<thead>
<tr>
<th>Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outpatients</td>
<td>10,000 patients</td>
</tr>
<tr>
<td>Hospitalizations</td>
<td>&gt; 600 patients</td>
</tr>
<tr>
<td>Emergencies</td>
<td>800 patients</td>
</tr>
<tr>
<td>Intraocular surgeries</td>
<td>320 surgeries</td>
</tr>
<tr>
<td>Micro surgeries</td>
<td>200 surgeries</td>
</tr>
</tbody>
</table>

(Source: Head of the Department: Prof. kozobolis)

SWOT Analysis

In order to achieve an efficiency study within the dept. of Ophthalmology, a SWOT analysis of the clinic will be analyzed so as to retrieve certain irregularities, of
which corrective actions will be proposed. In what follows, the strengths, weaknesses, threats and opportunities will be presented in the following Figure 1: SWOT ANALYSIS.

Figure 1: SWOT ANALYSIS of UEC.

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Academic, high qualified medical staff since the dept. is a university clinic</td>
<td>- Lack of jurisdiction to purchase medical equipment so that the clinical aspect can take place in the best possible conditions. The supply chain is managed by the hospital.</td>
<td>- In the process of implementation of ISO 9001:2015 system, for improving quality management</td>
<td>- Further decrease of the hospital budget provided by the Health Ministry due to unstable economic situation in Greece and therefore to the money given to the UEC</td>
</tr>
<tr>
<td>- Continuous research, integration of innovative health management systems and implementation of new therapeutic protocols</td>
<td>- Lack of jurisdiction to hire human and material resources to provide a higher quality of health care.</td>
<td>- Existence of the Department of Quality, Research and Continuous Education, in the hospital, aiming at the implementation of an integrated total quality system.</td>
<td>- Increase of patients need cataract surgery may decrease the service quality (the demand for cataract surgery is expected to strongly increase as the population is ageing ([Tan et al., 2013).)</td>
</tr>
<tr>
<td>- Continuous medical education and specialization of health care workers i.e. residents.</td>
<td>- Limited automation of medical data and use of IT systems (to all of the stages of the patient journey)</td>
<td>- Funding opportunities in the context of European funding schemes</td>
<td>- Unstable political environment and potential changes in legislation concerning the supplies and available resources (i.e. decrease of number of new staff).</td>
</tr>
<tr>
<td>- New premises, spacious bedrooms</td>
<td>- Medical staff (surgeons) is insufficient in relation to the volume of the patients need cataract surgery.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Low budget compared to the material resources needed.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Time consuming bureaucratic procedures in case of service and maintenance of equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Low rate of hiring new staff compared to the rate of staff that is retired</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Strengths:**

- Academic, high qualified medical staff since the dept. is a university clinic
- Continuous research, integration of innovative health management systems and implementation of new therapeutic protocols
- Continuous medical education and specialization of health care workers i.e. residents.
- New premises, spacious bedrooms
- Existence of the Department of Quality, Research and Continuous Education, in the hospital, that aims at the implementation of an integrated total quality system.
**Weaknesses:**

- Lack of jurisdiction to purchase medical equipment so that the clinical aspect can take place in the best possible conditions - The supply chain is managed by the hospital.
- Lack of jurisdiction to hire human and material resources to provide a higher quality of health care.
- Limited automation of medical data and use of IT systems (to all of the stages of the patient journey)
- Medical staff (surgeons) is insufficient in relation to the volume of the patients need cataract surgery.
- Low budget compared to the material resources needed.
- Time consuming bureaucratic procedures in case of service and maintenance of equipment
- Low rate of hiring new staff compared to the rate of staff that is retired

**Opportunities:**

- In the process of implementation of ISO 9001:2015 system, for improving quality management
- Funding opportunities in the context of European funding schemes.

**Threats:**

- Further decrease of the hospital budget provided by the Health Ministry due to unstable economic situation in Greece and therefore to the money given to the UEC.
- Increase of patients need cataract surgery may decrease the service quality (the demand for cataract surgery is expected to strongly increase as the population is ageing ((Tan et al., 2013)).
- Unstable political environment and potential changes in legislation concerning the supplies and the available resources (i.e. decrease of number of new staff).
Services

Most products of the hospitals are services. They include medical assessment, diagnostic and treatment services, medical rehabilitation services, preventive care services, health education, promotion and training services, industrial health services, and a vast array of related social services. They are a variety of tangible health care products as well; all are intended to benefit people’s health.

However the nature of the services offered by hospitals varies from the services offered by other firms. Hospitals do not really sell services but they sell the benefits of satisfaction the patients get from receiving services. The product elements of hospitals consists of the actual medical treatment provided in the hospitals, education, training and they also include supplementary services like maintenance of the case history of patients, registration, billing and support operations security, parking facilities etc. These supplementary services help to give a tangible effect to the intangible nature of the services provided.

Most of the hospitals could be characterized as organizations with multi services. The teaching hospitals have three product lines, that each has many specific products. The product mix in the Dept. of Ophthalmology, in terms of its length, width, and depth could be described in the Table 2: Product Mix in UEC

<table>
<thead>
<tr>
<th>Product line Width</th>
<th>Product mix Length</th>
<th>Health promotion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical (17 debs)</td>
<td>Emergency</td>
<td>Under graduate courses</td>
</tr>
<tr>
<td></td>
<td>Walk in clinic</td>
<td>Post graduate courses</td>
</tr>
<tr>
<td></td>
<td>Outpatient Therapies</td>
<td>Courses for residents</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conference participation</td>
</tr>
<tr>
<td>In patient Services</td>
<td>Ambulatory Services</td>
<td></td>
</tr>
</tbody>
</table>
Characteristics of Services

Concerning the nature and characteristics of the services of a hospital, and particularly in the case of a cataract surgery, they are characterized by: Intangibility, Inseparability, Variability and Perishability.

Intangibility is explained by the fact that services are not tangible, that is they cannot be seen, tasted, felt, heard, or smelled before their production. In the case of cataract surgery, a patient cannot see the result and know the value of the service before the end of the surgery. That characteristic plays a very important role on the trust that the patient has to the surgeon and to the trustworthiness of the surgeon.

A cataract surgery cannot be produced and delivered unless the surgeon and the rest staff is there so as the necessary equipment. Consequently, a service cannot be separated from its providers, resulting this way in the inseparability of it. This characteristic of the services may result in a limitation of the appropriate providers, with the risk of either patients wait too long for the service or jeopardize the good quality by lowering the standards.

A cataract surgery may differ depending on the surgeon; A high qualified and experienced ophthalmologist is likely to provide a service of higher quality than the same operation performed by a resident with less experience. Therefore, variability is another characteristic of a service provided by a hospital and services can be highly variable depending on its providers. Therefore, hospitals should make an effort to provide high consistent quality in their service offers, and to monitor the consistency of quality with an integrated quality management system.

A service cannot be stored and offered another time. An ophthalmologist that supposed to perform 10 surgeries per day cannot produce five operations the first day and fifteen the next day because there were not enough patients. The demand of a hospital’s services, concerning the perish ability of the services should be carefully considered in the designing of strategies. A cataract surgery is a programmed operation and the available recourses can be predicted avoiding losing them. On the contrary, in the emergency unit the demand is fluctuating and service capacity is more difficult to be successfully planned (MARKETING OF HOSPITAL SERVICES, 2011).
**Flower of Service**

The Flower of Service *(Figure 2)* concept by Lovelock et al. is used to display the two types of supplementary services that surround the core product: Facilitating supplementary services and enhancing supplementary services.

*(Lovelock and Wortz, 2007).*

Specifically, there are three areas of activities and services offered by the UEC:

1. **Clinical**
2. **Research**
3. **Education**

In detail, concerning the **clinical services**, the UEC is a tertiary referral centre for eye diseases that provides integrated care to beneficiaries from all Eastern Southern Greece.

**Research activities** are concentrated in basic, clinical and epidemiological research activities that are performed in the department and there are also published scientific articles written by the scientific staff (Professors, PhD students, Fellowship students).

In **education**, there are two courses of Ophthalmology—one of which is compulsory and the other is optional— in the undergraduate Medicine degree and there is also a post graduate degree that is being offered. Also, twice a week, there are lessons for the residents of ophthalmology.
Taking into consideration the abovementioned nature and characteristics of hospital services, a presentation of the Flower of the UEC services (Figure 3), is presented as following:

**Figure 3: Flower of Service of UEC**

- **Core offerings:**
  - Medical services
  - Research
  - Education

- **Information**
  - Website (www.pgna.gr)
  - Secretariat

- **Order taking - Applications**
  - Telephone center for appointments

- **Consultation**
  - Written post-operative instructions and prescription to the patients
  - Scheduling appointment for re-examination

- **Billing**
  - Office for payment that issues receipt.

- **Payment-Self service**
  - Payment is generally not required; the costs are played directly to the hospital by the insurance fund
  - Payment is only required for outpatients afternoon visits, only in cash.
  - Available ATM

- **Hospitality**
  - Parking availability
  - Toilets and washrooms in every room
  - Toilets in the waiting areas and in all premises
  - Chairs in the rooms and in the waiting areas
  - Elevators

- **Safe keeping**
  - A small bedside table for each bed.

- **Exceptions**
  - Wheelchairs available upon request
  - Parking near facilities when is needed.

**Core services:**

- Provide **medical services from diagnosis to treatment**
- Conduct **research**
- Provide all levels **educational programs** of high quality.
**Supplementary services:**

- **Facilitators:**
  
  **Information**
  - Website (www.pgna.gr)
  - Secretariat

  **Order taking-Applications**
  - Telephone center for appointments

  **Billing**
  - Office for payment that issues receipt.

  **Payment-Self service**
  - Payment is generally not required; the costs are paid directly to the hospital by the insurance fund
  - Payment is only required for outpatients afternoon visits, only in cash.
  - Available ATM

- **Differentiators:**
  
  **Consultation**
  - Written post-operative instructions and prescription to the patients
  - Scheduling appointment for re-examination when is needed

  **Hospitality**
  - Parking availability
  - Toilets and washrooms in every room
  - Toilets in the waiting areas and in all premises
  - Chairs in the rooms and in the waiting areas
  - Elevators

  **Safe keeping**
  - A small bedside table for each bed.

  **Exceptions**
  - Wheelchairs available upon request
  - Parking near facilities when is needed.
Flowchart

A flowchart is a picture of the individual steps of a process in a sequential order. It is a generic tool that is used to analyze the sequence of steps within a process and can be adapted for a wide variety of purposes. Some of the elements that may be included in the flowchart are:

- The sequence of actions
- The materials, services, entering or leaving the process and the people and time involved (inputs and outputs)
- The decisions that must be made
- Process measurements.

(ASQ American Society for Quality, 2017)

The leading cause of curable blindness in the world is cataract, a clouding of the eye’s lens. In many countries, the most frequent surgery ophthalmic surgical procedure is cataract. Thus, cataract surgery could be characterized as a high-volume, relatively low complex procedure (Van Vliet et al., 2010). In Greece, the number of annually cataract surgeries is 50,000 (Karatzafiri, 2017)

In the following flowchart, the steps that should be followed in UEC, in case of a cataract surgery, are being presented. The flowchart is based in the templates of ASQ American Society for Quality and Lovelock C., Wortz J.

The following flowchart (Figure 4) is not concentrated only on the day of the surgery and to the detailed medical procedures, but it illustrates all the stages that a patient undergoes from booking an appointment until the completion of the surgery in order to depict the general process of the cataract surgery.
Figure 4: Flowchart of Cataract surgery at UEC

Personas

The personas are considered to be as archetypes that are based on the detailed observation of the potential users. Each persona represents a fictional character who illustrates important characteristics of the social target groups that they represent (Tassi, 2017)

A persona is a useful service design tool that is used in the design of customer interfaces in the development phase of a service and is one of the methods or interaction design (other methods of interaction design are customer segmentation, empathy map and role play) (Meiren, 2016)

The information that personas should include are the following:

- Realistic name and picture
- Demographics (e.g. age, gender, family)
- Job (e.g. occupation, competencies, salary)

See Appendix A3 for explanation of the symbols and notes on the flowchart
• Personality (e.g. goals, values, needs)
• Likes and dislikes
• Personal quote

Aging involves progressive deterioration in both physiological and psychological abilities, creating special needs among the aging population segment. These needs are often ignored in the design, development, trial and adoption of consumer health products resulting in low adoption and usage among the aging adults (LeRouge et al, 2013).

The implementation of the UCD tools could contribute to the disease management and especially in the elderly population. As far as the benefits of using personas in the design process are concerned, the improved communication among the target users, the design team and the other stakeholders is one of the widely described benefits met in literature. Moreover, the use of personas has been commonly linked to an increased focus on the needs of the target group (Miaskiewicz and Kozar, 2011).

Two personas a male and a female are presented (Figures 5 & 6). The personas are based on the principles of the User-centered design (UCD) that is based on designing upon a strong understanding of the intended users. The implementation of UCD principles has been gaining ground in the field of e-Health and health IT (Holden et al, 2017).
Figure 5: 1\textsuperscript{st} Persona “Maria”

<table>
<thead>
<tr>
<th>Medical</th>
<th>Functional</th>
<th>Psychological</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maria has been diagnosed with cataract 3 years ago in both eyes and her vision has been slightly deteriorating since then. She has also arterial hypertension.</td>
<td>Although able to manage her hygiene and daily activities, Maria notes she has issues with pains in the legs especially at nights.</td>
<td>Maria feels moderate anxiety. She perceives moderate difficulties in performing daily activities.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social</th>
<th>Healthcare System</th>
<th>Health Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maria is married and lives with her husband. She has two children and 4 grandchildren and Maria helps raising up her grandchildren. Her husband helped care for her after she was discharged from the hospital.</td>
<td>Maria does not visit a doctor in a regular base but only when it is extremely needed. She uses the services of the NHS.</td>
<td>Maria does not exercise as a daily routine. She is overweight.</td>
</tr>
</tbody>
</table>

(Source of photo: https://www.thespruce.com/yiddish-name-for-grandmother-1695385)

Figure 6: 2\textsuperscript{nd} Persona “George”

<table>
<thead>
<tr>
<th>Medical</th>
<th>Functional</th>
<th>Psychological</th>
</tr>
</thead>
<tbody>
<tr>
<td>George has cataract in eyes, type 2 diabetes, hyperlipidemia</td>
<td>George does not have significant issues with caring for himself or with his hygiene. However he reports being quite exhausted.</td>
<td>George considers himself quite knowledgeable about personal health. He rarely feels depressed or down in the dumps.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social</th>
<th>Healthcare System</th>
<th>Health Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>George is married and lives with his wife. He has four children and 7 grandchildren. He daily visits the coffeehouse and every weekend has visits from his children and some of his youngest grandchildren.</td>
<td>George visits the doctor annually and does a check-up.</td>
<td>George takes care of his garden and house animals (dogs, cats, chickens) daily and considers this as an exercise. He is also trying to have a healthy diet.</td>
</tr>
</tbody>
</table>

Blueprint

Another operational tool that illustrates in detail the service interaction process is a blueprint-a tool that also could be describes as a more complicated and elaborated version of a flowchart. It is based on graphics and depicts the process functions above and below the line of visibility to the customer. The overall user experience is described through a diagram that contains all the activities, flows, physical evidence, and lines of visibility and interaction (Tassi, 2017).

The service blueprinting visually illustrates the overall service process, including organizational structure, all relevant actors, and their activities from a patient point of view. The service blueprint focuses on inside-out capabilities therefore it would allow the recognition of organizational internal processes and contacts with patients. All activities and capabilities in the process, the sequence and the connection between them are being presented in the blueprint.

Moreover, this map could also be used for the identification of the resources that are used in each activity so the organization could distinguish between the key competencies that need to be supported, those that need urgent action for improvement. Thus, service blueprinting provides additional information that is useful to enhance the value creation process (Ceric et al, 2016).

In the following blueprint (Figures 7-10), the cataract patient’s journey in UEC, from the day that she/he calls and asks for an appointment until the day of the cataract surgery, is being presented and it is divided into four Acts.

There is an identification of potential fail points (F) and waiting points (W) in order to recognize the risks so as to take preventive measures and do failure proofing.

The information that has been used for the design of the blueprint was based on the following research methods:

- Observation
- Interviews with staff and patients
- Data collection
- Survey
Figure 7: Blueprint of Cataract patient in UEC, ACT 1: Introductory scenes

**SERVICE BLUEPRINT UEC**

**SERVICE STANDARDS AND SCRIPTS**
- Book appointment
- Park car/Bus Station
- Registration
- Go to outpatients and drop medical record to desk

**PHYSICAL EVIDENCE**
- Sound and tone of voice of employee
- Space for parking car
- Time for waiting bus
- Parking Space
- Bus station-Electronic time schedule
- Building

**PATIENTS ACTIONS**
- Ask for doctor specialty
- Confirm date & time
- Check availability
- Insert appointment
- Maintain reservation system

**ON STAGE/VISIBLE CONTACT/EMPLOYEE ACTIONS**
- Response time
- Script for booking appointment
- Time for registration
- Place for medical records
- Script for guiding patient to the waiting room

**BACK STAGE/INVISIBLE CONTACT/EMPLOYEE ACTIONS**
- Cleaning
- Medical records
- Database
- Schedule system

**SUPPORT PROCESS & SYSTEMS**
- Asks for medical booklet & confirm the patient’s name;
- Search for medical record/file on inventory
- Give patient the record/file
- Print schedule and handle to the nurse
- Send schedule electronically to outpatients
- Nurse confirms the name of patient
- Outpatients
- Desk for medical records
- Nurse appearance
Figure 8: Blueprint of Cataract patient in UEC, ACT 2: Preparation of Core Service
Figure 9: Blueprint of Cataract patient in UEC, ACT 3: Delivery of Core Service
Figure 10: Blueprint of Cataract patient in UEC, ACT 4: Completion of service
The blueprints in detail:

**Act 1: Introductory Scenes**
- Book appointment
- Park car/Bus station
- Make registration
- Go to outpatients and drop medical record to desk

*Potential fail points:*
- Waiting time to get through the telephone - limited staff
- No availability of booking an appointment via internet or other ways than telephone
- Waiting time between the call until the appointment;
- The patient may fail to book an appointment because of limited availability and low flexibility
- The patient may misunderstand or mishear the date of the appointment
- Waiting time to register to the front office and take the medical records/file; There are three (3) people for the whole hospital
- Fail to find the medical record – No electronic database only hardcopy available
- Fail point: The medical record may be lost

**Act 2: Preparation of Core Service**
- Patient waits at outpatients
- Patients is called to the examination room by the nurse
- Patient is examined by the doctor
- A diagnosis is made by the doctor
- A cataract surgery is proposed
- Preassessment - Check of lens availability
- Schedule surgery; The patient discuss with the doctor the details about surgery and they schedule the surgery

*Potential fail points:*
- Waiting time until called by the nurse; only 1 nurse is available
- Waiting time-Patient may not hear the nurse calling the name and miss his/her turn
Fail point: The equipment may be out of service and patient has to come another day for examination

Waiting time - Patient has to move to the clinic (another floor) for the pre-assessment and wait there other patients who are being examined (those patients who wait for surgery)

The printed examination may be lost by the patient

Resident may forget to call doctor or doctor cannot reach the phone call because another patient is being examined

Waiting time for the surgery - Potential limited or not available resources not available resources (intraocular lens)

The waiting list is not electronic and hence it may not be updated or be available at the moment

Act 3: Delivery of Core Service

Registration - Patient takes medical record

Preparation for the surgery by the nurse and resident

Transfer to the surgery room

Cataract surgery

Transferred to the room

Potential fail points:

Waiting time to register to the front office and take the medical records/file - 3 people for the whole hospital

Waiting time for preparation because staff are not trained according to a written procedure

Waiting time for transfer due to lack of integrated information system between clinic and surgery room

Fail point: Fail to have the surgery due to lack of supplies and out of service equipment

Act 4: Completion of the service

Post-operative examination by the surgeon; Surgeon gives instructions to the patient and they schedule a follow-up visit
Electronic prescription by the resident

Discharge procedure; the patient’s companion takes the documentation from the resident and delivers it to the relative office in another floor.

Patient leaves

**Potential fail points:**

- Waiting time for post-operative examination
- Waiting time for electronic prescription
- Waiting time for discharge procedures
- Fail point: Medical records may be lost while resident transfers them

**Identification and analysis of potential problems**

**In Act 1,** where the patient calls for an appointment and comes to register there are some waiting and failing points. The waiting time for the call could be long, the employee could fail to confirm the date, the patient could wait a long for the registration, and the medical file could be failed to be find. Based on this description, one could recognize the lack of alternatives when trying to book an appointment and the old-fashioned medical records in hardcopy rather than the existence of electronic records.

**In Act 2,** when the patient is being examined and diagnosed, there are waiting times that derives from the lack of automated and integrated electronic and IT systems and several fail points. There is a risk of the equipment to be out of order due to delayed service and the patient would not be examined as required. This problem has two roots: The first is that service and maintenance of the equipment should be required and processed on time based on a standard documentation and procedure and secondly, the hospital should have the necessary budget and human resources to complete those actions.

**In Act 3,** again the lack of electronic medical files and limited human recourses in registration office, and IT systems increase the waiting time. Also there is a risk of failing to have the service due to lack of supplies.

Finally, **in Act 4** there are also a lot point that a patient waits, that are also due to limited human recourses and lack of IT systems and electronic records. For instance,
the resident prepares the documentation for the discharge, and the patient’s relatives have to wait to the relative office for stamp on the papers.

Concluding, the problems that are causing the waiting and failing points could be summarized in the following points:

- IT systems
- Electronic medical records
- Supplies
- Human recourses
- Standardized procedures-Training of staff

Some failure proofing and poka-yokes are being presented in order for the process design to be improved.

**Failure Proofing and Poka-yokes**

Based on the identification of fail points on the blueprint, failure proofing could improve the process and help staff and patients avoid future risks. The poka-yokes are “mistake-proofing” according to the Japanese approach of lean manufacturing (BUSINESS DICTIONARY, 2017).

The lean production approach was first initiated by Toyota car industry and it aimed at decreasing waste and implement continuous process improvement. Two methods of lean manufacturing are “jidoka”: stop the process when a problem occurs and “poka yoke”: mistake proofing”. The use of these methodologies is spreading from manufacturing into healthcare.

The “jidoka” concept is usually used to avoid medical errors and it proposes to stop a medical procedure for the safety of the patient when the doctor is not confident about the result. The “poka-yoke” method could be divided in three actions:

- Mistake prevention: keeps mistakes from occurring.
- Mistake detection: informs workers that a mistake has occurred
- Preventing the influence of mistakes: mitigate the results of the error

(Mistake-proofing (Grout, Toussaint, 2010).
The following proposed poka-yokes and possible solutions are based on the previous identification of potential problems and obstacles in process of a cataract surgery, and target to support the service process and decrease or even eliminate waiting time and/or fail points:

**ACT 1**

- Set an electronic system for booking appointment via internet in order to decrease long waiting time in calls
- Program automated telephone responses for booking an appointment in order to decrease waiting time in calls
- Electronic registration to decrease long waiting queues
- Electronic medical records/file to avoid losing the files and eliminate waiting time searching hardcopies
- Stickers with different colors and successive numbers, with the name of each patient on it, for the nurse to reduce the risk of losing records
- Written instruction to the staff to repeat date and time of appointment to the patient

**ACT 2**

- Set a maximum time of examination procedure of each patient, place a chronometer in exam room
- Electronic banner with the name of next patient and the time of waiting that informs patients by an automated voice
- Set standard procedures and documentation for requesting maintenance and service of equipment through implementation of ISO 9001:2015
- Electronic waiting list of surgeries
- Electronic database for supplies that inform about the remaining resources
- Put sufficient signs and signal to the hospital to help patients find departments easily-Written maps available at the registration office
- Give patient written instructions for the procedure that will be followed at the day of the surgery (ISO 9001:2015)
**ACT 3**

- Electronic system that integrates all the departments of the UEC (outpatients, surgery room, clinic) and staff update it in each step of the procedure
- Electronic database for supplies
- Standard procedures according to which staff will be trained (ISO 9001:2015)

**ACT 4**

- Supportive administrative staff for medical prescription
- The waiting time for post-operative examination is difficult to be eliminated or decreased because usually the surgeon examines the patients that he/she operated and not another doctor
- Documentation for discharge could be made electronically by the supportive staff of the clinic and the discharge office.

**Process Performance Metrics**

(Lead time, Throughput Time, Cycle Time WIP)

Every process should be challenged in the context of continuous improvement. In an attempt to quantify the value of the service (cataract surgery) and identify opportunities for improvement, an analysis is attempted, with the use of fundamental management operation performance measures.

Based on interviews with the head of the UEC, (Prof.Kozobolis Vassilios, 30th Oct.2017) and personal observation the following results are drawn:

**Definitions for the equations’ parameters:**

- **Lead time** is the time between the initiation and delivery of a work item.
- **Cycle time** is the time between two successive deliveries
- **Throughput** is the rate at which items are passing through the system.
- **WIP** – Work in progress; the number of work items in the system. Work that has been started, but not yet completed (Caroli, 2017).

Utilization rate is the proportion of time a resource is actually used.
Throughput Efficiency is a measure of value added time in the system: Value-added time / Throughput Time (Katsaliaki, 2015).

**Analysis:**

**Lead time**

Two lead times are being analyzed, the first one is the time between the diagnosis and the surgery and the second one includes also the waiting time between the call and the appointment for the diagnosis.

Lead time is the time between the diagnosis of cataract in outpatients, and the surgery, and it is:

- Lead Time = Time between diagnosis and surgery = 45-60 days
- Lead Time = Time between patient’s call and the appointment + Time between diagnosis and surgery
  
  = 30 days + 45-60 days

**Lead Time = 75 to 90 days**

**Lead time is split in:**

Access time to the hospital: The number of days between contacting the hospital and the first appointment for consultation by the ophthalmologist and

Waiting time for cataract surgery: The number of days between the first consultation/diagnosis and the surgery.

Therefore, the lead time for a cataract surgery is either 45-60 days if the waiting time for the appointment is not included or 75-90 days, if the waiting time for the appointment is included.

**Cycle Time (CT)**

CT = Active Working hours / Number of daily surgeries =

CT=8 hours (/surgeon) / 8 daily surgeries

**CT = 1 hour**

Cycle time
Work in Progress (WIP)

Work in progress is the number of patients that are being operated every day for cataract: **WIP=8 patients**

Value added time

Value-added time is the time that a cataract surgery lasts, starting from the time the patient is transferred to the surgery until the end of the surgery. **Value-added time=0.50 hours (30 minutes)**

Throughput Time

Throughput Time= WIP X Cycle Time
Throughput Time = 8 patients x 1 hour

**Throughput Time = 8 hours**

That means that the time a patient stays in the hospital at the day of the surgery, from the time he/she registers until the time he/she is discharged and leaves the hospital is 8 hours.

Throughput Efficiency

Throughput Efficiency= Value-added time/ Throughput Time
Throughput Efficiency= 0.50 hours /8 hours

**Throughput Efficiency= 0.0625 or 6.25%**

That result means that from the total time that the patient stays in the hospital only the 6.25% of it concerns the surgery (the service).

Utilization rate

Bed utilization rate= Beds occupied/ Beds available x 100 (daily)
Bed utilization rate= (10/17) X 100

**Bed utilization rate= 58.82%**

This means that although the available bed capacity is 17 only 10 are used in a daily basis. Therefore the bed utilization rate is relatively low at 58.82%.
On the following Table 3, all the above mentioned metrics are presented:

**Table 3: Performance Metrics of UEC.**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lead Time= Time between diagnosis and surgery.</td>
<td>45-60 days</td>
</tr>
<tr>
<td>2. Lead Time= Time between patient’s call and the appointment + Time between diagnosis and surgery</td>
<td>75-90 days</td>
</tr>
<tr>
<td>Cycle Time= Active Working hours / Number of daily surgeries</td>
<td>1 hour</td>
</tr>
<tr>
<td>WIP = Number of patients that are being operated daily</td>
<td>8 patients</td>
</tr>
<tr>
<td>Value-added Time= The time that a cataract surgery lasts</td>
<td>0.50 hours or 30 minutes</td>
</tr>
<tr>
<td>Throughput Time= WIP X Cycle Time</td>
<td>8 hours</td>
</tr>
<tr>
<td>Throughput Efficiency= Value-added time/ Throughput Time</td>
<td>6.25%</td>
</tr>
<tr>
<td>Bed Utilization rate= Beds occupied/ Beds available x 100 (daily)</td>
<td>58.82%</td>
</tr>
</tbody>
</table>

**Conclusions on performance metrics**

The conclusions that could be drawn based on the performance metrics analysis are the following:

The maximum lead time, that is the time that a patient has to wait from diagnosis until the operation day, is between 60 and 90 days, depending whether or not the waiting time for the appointment is included. In Greece, there is not a legal context or any other national objective of the maximum lead times of cataract or other surgery, and data from other hospitals concerning lead times are not published and available. However, in UK the National Health Service, sets an objective of “18-week pathway” that suggests that a patient should not wait longer than 18 weeks, i.e. 126
days, after referral to hospital for any treatment (Van Vliet, 2010). Therefore, the lead time in UEC, seems to be among the accepted time limits.

The value-added time, the time the cataract patient is being operated, is 30 minutes and the throughput time that the patient stays in the hospital at the day of the hospital is 8 hours. That means that the throughput efficiency is only 6.25%, meaning that the efficient time for the patient, the time that receives the service (the cataract surgery) is very low and the rest 93.75% of the time, the patient does the following:

- Being prepared by the nurse for the surgery
- Resident updates medical history-examines the patient
- Waits for the surgery
- Waits for discharge procedures

In order to increase the value-added time and the throughput efficiency, actions to eliminate the inefficient time should be taken. These actions should be focused in designing a more efficient service procedure for the cataract patient. The specific waiting and failing points have already been highlighted at the previous part of failure proofing and poka-yokes and corrective actions were recommended. Some steps and waiting times as the preparation, and wait for the surgery is difficult to eliminate due to limited human resources, but other such as an automated IT system for discharge procedures and electronic medical records could be easier applicable.

The bed utilization rate could be characterized as low, as only 58.82% of the beds are used daily for cataract surgery. Given the fact that 80% (8 out of 10 surgeries) of the daily surgeries are cataract surgeries, we could conclude that more cataract surgeries could be done daily. This could decrease the lead time of the patients. Although, to achieve an increase in daily surgeries, based on the data that each surgeon operates at the maximum of his capacity, a relative increase in human resources, surgeons, resident nurses, should be made. Human resources in a public hospital could only be initiated from the Health Ministry and the government and not form the Head of each department or the Head of the hospital.
Recommendations on Service Quality

One way of increasing the quality, and design an efficient service process is through implementation of quality standards. One of these standards is the ISO 9001:2015. The ISO 9001:2015 could provide the context for adopting corrective actions and mitigation risk plans, for the waiting and fail points and the inefficiencies that were identified in the previous chapters.

ISO 9001:2015 (International Standardization Organization)

Prior to this case-specific implementation and its advantages in the service process, the history and some important information for this quality management standard are presented.

History of ISO 9001: Health Care Sector

The ISO story began back in 1947 in London by Civil Engineers from all over the world. There are 2,1932 International Standards published until 2017, covering almost all aspects of technology and manufacturing. Among the most popular standards are the following:

- ISO 9001 Quality management
- ISO 14001 Environmental management
- ISO 13485 Medical devices
- ISO 639 Language codes
- ISO 26000 Social responsibility
- ISO 45001 Occupational health and safety
- ISO 22000 Food safety management

ISO 9001 is an internationally recognized set of criteria for quality management system (QMS) that organizations can be certified for their services. Any kind of organization, large or small, in every field of activity could use this tool. This standard is based on a number of quality management principles such as a strong customer focus, the motivation and implication of top management, the process approach and continual improvement.
The adoption of ISO 9001 contributes to the delivery to customers of consistent, good quality products and services, resulting in that way to many potential benefits both for the customer and for the organization (ISO, 2017). The latest version of ISO 9001 was published at 2015 and the standard was named after the date of publication as ISO 9001:2015.

Specifically in health sector, in 1996 the American Legion Hospital in Crawley, LA, became the first hospital to register to ISO (ASQ, 1999). According to the study of Vitner, about implementing engineering methods in the Neonatal Intensive Care Unit of Hillel Yaffe Medical Center in Israel, the data supported the conclusion that performance measurements of yield indicators and customers’ satisfaction improved after the adoption of ISO 9001. This case supports the claim that systems engineering methods including the ISO 9001 standard can be implemented not only in manufacturing organizations but they are also suitable and efficient in service organizations such as care units in hospitals (Vitner, 2015).

In health care, ISO 9001:2015 gives health providers the opportunity of reducing inefficiencies and waste, thereby experiencing significant cost savings, while maintaining a focus on patient satisfaction. A brief description of ISO 9001’s 20 elements and their application for health care providers that could improve their quality and customer service are the following:

- Management responsibility. This applies to both administrative and clinical operations.
- Quality system. Health care providers must establish a quality manual
- Contract review. Ensure that all written materials creating patient expectations are accurate
- Design control. It defines the steps that must be taken by the hospital when new or additional services are considered for implementation
- Document and data control: The right documents must be available and indexed so they are readily accessible.
- Purchasing: Ensures the accurate and timely purchase of materials and supplies from approved suppliers
✓ Control of customer supplied product: Any items that are used in the delivery of services, but are not the property of the health care provider must be identified and controlled.

✓ Product identification and traceability: Patients’ records should be easily traced and updated.

✓ Process control: Control the conditions such as equipment, staff etc that are included in the service delivery.

✓ Inspection and testing: Objective monitoring of the accuracy and timeliness of patient care and all supporting functions that affect that care

✓ Control of inspection, measuring and test equipment: Process through which equipment is properly calibrated.

✓ Inspection and test status: Verification that assessments, inspections and tests have been performed

✓ Control of nonconforming product: Nonconforming services could be electrical outages that shut down a surgical room, untrained personnel conducting a patient testing procedure, or a loss of critical patient records. Procedures that prevent unintended use or installation should be adopted by health providers.

✓ Corrective and preventive action: Includes internal audit process, which identifies inconsistencies, drives corrective and preventive action and reports corrective actions

✓ Handling, storage, packaging, preservation and delivery:

✓ Control of quality records

✓ Internal quality audits

✓ Training: Training of staff in order to have the qualifications that are required.

✓ Servicing

✓ Statistical techniques: Statistical process control (ASQ, 2009).
ISO 9001:2015 in UEC

In University Hospital of Evrou, there is an autonomous department, under the administrator of the hospital, of Quality Research and Continuous Education, since 2012. The department is staffed with two employees, one nurse and one Biochemist. The aim of the department is to implement and integrated quality management system so as the hospital provides high quality services to patients.

In this attempt, the department initiated the certification of ISO 9001:2015 in every department of the hospital. A written request was sent to all departments at the beginning of 2016, in order for them to express their interest of receiving the certification of the ISO standard. The UEC, replied positively and the procedure began. There were also two meeting organized by the Quality department, where in cooperation with a private consulting company, informed the interested departments about ISO.

The initial request of the Quality department was for the UEC, to record the operating procedures that are followed in the clinic and a detailed description of the process that the services are being offered. The head of the UEC, appointed four staff members in the team for the ISO implementation. The team responsible, noted down the process design and the Quality department was informed accordingly.

At this point, the UEC, waits for the proposals of the Quality department and the private counselor, in order to use documentation and processes based on the ISO 9001:2015 and increase the quality and speed of the clinic’s services. After that step, the UEC will be accessed for receiving the certification of the ISO 9001:2015.

Focusing deeper in the abovementioned specific clauses of the standard, there could be a correlation with the specific needs of the health care provider and when implemented benefit both the provider-the UEC in this case- and the patient, with the most important of them described as follows:

Clause 4: Requires the organization to define the context of its services and the interests of all its stakeholders that is all the interested parties such as patients, relatives, other health providers, insurers, etc. in order for the organization to ensure that all needs are being met. In the UEC, the identification of the parts that are
included in the service process could contribute to the design of most efficient cataract surgery pathways.

Clause 6: Requires the organization to define and manage its risks associated with service provision including clinical, resource, equipment, and infrastructure. This requirement could be very crucial in the UEC, where some waiting and failing points could derive from problems in those factors.

Clause 7: Requires the establishment of sufficient support services including competent staff and sufficient training, suitable infrastructure, suitable and sufficient equipment and working environments, staff wellbeing and communication. Once again, this requirement could mitigate the risk of waiting and failing points in the journey of the cataract patient in the UEC.

Clause 8: Requires effective service and care planning and control at both a service and patient/service user level. This requirement could support the effective identification and traceability of documents records patient and service uses and property, that is a recognized problem in the UEC, with the issue of medical records as described in the blueprint.

Clause 10: Requires the effective management of complaints, incidents, non-conformities and the implementation of correction and improvement measures. Feedback is a very important process that enables continual reduction in risk and improvement of the service and it would benefit the provider and the patient. The UEC, could also take advantage of this requirement by identifying the patients’ complaints and take corrective actions.

ISO 9001:2015 Implementation

In the case of UEC, almost all of the above principles described in the part of presentation of ISO 9001:2015, could be adopted and improve the service that is provided, in this case the cataract surgery. More specifically and based on the problematic areas that were identified in the blueprint of UEC, a document and data control is very important as many waiting and failing points could arise due to lost or not updated medical records and other documentation.

The timely and accurate purchasing is also very important as a lack in supplies might end to fail to provide patient with the service needed on time. Control and
inspection of equipment is also vital for the delivery of the clinic’s services. Training staff so as the staff is competent and well-trained is another valuable part in the process chain. All these factors are important to be properly documented and be described in detail so as to track any inconsistencies.

Feedback is profoundly important in order to control the process quality of the service provided. To all the stages of the service delivery process two important documents could be used: The complaint form that should be available to patients for feedback and the form of unexpected incidents for proper feedback and initiation of corrective actions by the responsible staff. Also, internal quality audits could contribute to the timely implementation of corrective actions.

To sum up, there are several managerial instruments and methods that could be adopted and implemented in the UEC, for improving the medical services that are provided. However, there are some restrictions given the fact that it is a public organization that it may be affected by external factors and decisions that cannot be predicted.
Cost and reimbursement of Cataract surgery

As cataract is the leading cause of visual impairment in the world, this disease results in major economic and public health burden not only in developing countries—where 90% of the cases are recorded—but also in the developed countries. Surgery has been proven to be the only effective treatment for cataract (Fattore and Torbica, 2008).

Consequently, the cost of a cataract surgery is very important information both for the patients and for the public and private health providers. An analysis and a comparison between the cost and the reimbursement fees of the disease could be a valuable parameter in the design of more efficient health care services. This is supported also by the fact that cataract surgery is the most common single procedure performed in the developed world and will increase as the population continue to age (Fattore and Torbica, 2008). By calculating the cost of the cataract surgery per quality-adjusted life year (QALY) gain, a cost-effectiveness analysis could help health providers.

According to Hahn and Krummenauer that conveyed a cost utility evaluation of cataract surgery in developed countries, a consistent favorable cost QALY ratio for cataract surgery was proved, according to the British National Institute for Care and Health excellence threshold. However, and due to the large heterogeneity of the approaches and outcomes for all parameters and the complexity of the various evaluation methods and medical care processes the findings raise doubts about the general applicability of existing studies as a tool for allocation decision (Hahn, Krummenauer, 2017).

In the following analysis, the system of reimbursement fees in Greece and other European countries is being presented and there is a comparison of those fees among EU countries. Also, information for the cost of the treatment in the private sector in Greece and other countries is being provided.

A cost analysis of the treatment will be presented only for some European countries for which there are available data. A relative cost analysis for Greece, concerning the cataract surgery, will not be provided, as it requires a profound analysis and data that are not available at the moment and are not among the research
questions of this thesis. However, such a cost analysis is a prosperous field of future research in cost-effectiveness within different treatments and cost utility of specific interventions. Also data will be provided for the cost of the cataract surgery worldwide.

**Europe**

In the following Table there is a comparison of the average of reimbursement fees and the total costs for a cataract surgery in several European countries:

<table>
<thead>
<tr>
<th>Country</th>
<th>Reimbursement (€)</th>
<th>Total Costs (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>1440</td>
<td>602</td>
</tr>
<tr>
<td>England</td>
<td>N/A</td>
<td>623</td>
</tr>
<tr>
<td>France</td>
<td>1530–1578</td>
<td>909</td>
</tr>
<tr>
<td>Germany</td>
<td>597–1322</td>
<td>741</td>
</tr>
<tr>
<td>Hungary</td>
<td>551–554</td>
<td>318</td>
</tr>
<tr>
<td>Italy</td>
<td>968–1436</td>
<td>1087</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>1041</td>
<td>500</td>
</tr>
<tr>
<td>Poland</td>
<td>558–564</td>
<td>473</td>
</tr>
<tr>
<td>Spain</td>
<td>N/A</td>
<td>611</td>
</tr>
<tr>
<td>Greece</td>
<td>466</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>972</strong></td>
<td><strong>652</strong></td>
</tr>
</tbody>
</table>

N/A: Not Available

Total costs include: Lens, direct labor, overheads and other costs
*(Fattore and Torbica, 2008)*

The total costs cover the cost of labor, the cost of lens and overheads as well as other costs like drugs and other consumables during the whole process of the service provided that is before, during and after the cataract surgery *(Table 4)*.

The total costs and the reimbursement represent the average rates in each country, with public hospitals and private clinics to be included provided that they are representative health care providers in their country.
In the case of Greece, the data in Table 4, concern public hospitals and not private clinics, that is the reason the reimbursement fee is the lowest compared to the other countries. In the Greek private sector, the cost for a cataract surgery may vary between €1.500-2.500, including the costs of the private clinic and the surgeon’s payment. The reimbursement fee by private insurance companies to patients varies depending on the insurance program and cannot be estimated.

The reimbursement is the amount of money that is returned to each health care organization as a compensation for the service that they are provided. If the provider is public then the fees are returned by the national healthcare funds and when the providers is a private clinic then insurance companies cover a percentage of the cost.

In the following Charts 1 and 2, there is a reimbursement fees for each country and a comparison between the total costs and the reimbursement rates.

The healthcare costs and ranged from €318 in Hungary to €1087 in Italy while the reimbursement fees are from €466 in Greece to €1530–1578 in France (Chart 1).

In UK the cataracts surgery outside of the NHS may cost between €2.012–€3.355 (Laser Eye Surgery Hub, 2017).

Chart 1: Reimbursement

---

*Data are based on personal contact with various clinics in Thessaloniki and Athens, that they would like not be named*
As it is easily noticed, the average reimbursement fees are always above the average full costs, in all the cases with available data (Chart 2).

Chart 2: Reimbursement and Total Costs

In all countries except for Spain and England, there are specific rates for reimbursing the cataract surgery. In Denmark and the Netherlands, there are national rates that are homogenous across providers – i.e. all providers in each country receive the same reimbursement for cases of cataract surgery. In France, Hungary, and Poland, fees are different across providers, but only to a very limited extent. The reimbursement fees in France differed between private and public providers (€1578 vs €1530, respectively). In this country, public rates cover the cost of physicians, whereas in the private sector, physicians are paid a fee-for-service above the base rate. More significant variations were observed in Germany and Italy.

In Germany, the variations reflect the different settings in which cataract interventions can be performed, whereas in Italy variations reflect the different rate policies of regional governments. In Denmark, France, and the Netherlands, all providers were paid a rate sufficient to cover full costs. In Germany, Italy, and Poland, rates covered the costs incurred by some, but not all, providers (Fattore and Torbica, 2008).
In Greece the reimbursement fee is referring to the public sector and is the amount of money the hospital receives by the national insurance fund for a cataract surgery (in one eye). Data for the total costs in Greece are not available.

**Greece**

**The system of Diagnosis Related Groups (DRGs).**

In Europe each country is free to choose their own health care system, adapted to their specific needs, based on the fundamental principles of ensuring people's health. The search for a general European model that would apply to all Member States cannot be a viable solution, because each state does not share the same principles of rationalization and improvement of the health care system.

The common aim of all the healthcare systems despite their differences is the achievement of a higher standard of health care in addition to benefiting from low prices (Bradley, Ivascu, 2016).

However, there was an attempt to implement a similar categorization system of health services, adapted every time to the unique requirements of each country with the aim to simplify the description of healthcare products in order to effectively measure hospital effectiveness, outcomes and consequently for improving management and productivity.

This new methodology was in initiated in the 70’s by researchers at Yale University in the USA for the classification of the health services provided by Hospital Facilities. The services was categorized in accordance with the diagnosis, complications and comorbidities, age and sex of patients all of which formed a matrix for the sorting of patients into case mix groups called Diagnosis Related Groups (DRGs).

Since the 1980s the DRGs became a means of Hospital reimbursement and financing by both private insurance and government subsidiasing entities in the US. A cost reimbursement price was estimated for each category and the compensation to the hospitals was given in accordance to this fixed amount of money.

At the end of 1990s the system was adopted my most European countries including Germany, France, the Netherlands, Denmark, Spain and Portugal, after having been introduced by countries such as Australia whose methodology revolutionized reimbursement of its health system. Other neighbor countries of
Greece such as Italy, Turkey, Bulgaria, Cyprus, Serbia, Bosnia, Slovenia, FYROM and Croatia have adopted the system in the 2000s.

In Greece, the Committee responsible for the adaptation of the system has used micro costing and also the weights from other systems. Both estimates were very close with very few exceptions. The analysis considered all costs excluding labor cost being a cost covered by the Public Service Employee State Budget. It is notable that there is significant gap between true production cost and reimbursement cost, which alongside other parameters, explains the present hospital deficit (Maniadakis et al, 2011).

Eventually, the system of (DRGs) was implemented in Greece in 2012. According to relative health services classification, the reimbursement for a cataract surgery in a public hospital is 466€. The patient does not pay directly the cost to the hospital but the hospital is being paid by the public insurance fund after the surgery.

This cost includes all medical and nursing-related assistance provided by the hospital as well as the relevant expenses incurred for the provision of the above services (Moh.gov.gr, 2017).

USA

In the United States, most of the cost of cataract surgery is covered by Medicare (U.S. government funding for supporting Americans age 65 and older) or private medical insurance. The amount insurance companies pay for the procedure, and the portion of the cost that must be paid directly by the patient can vary widely, depending on the insurance policy, the type of intraocular lens (IOL) used for the procedure, and other factors. In cases when a person does not have Medicare or private medical insurance, the patient is responsible for the entire cost of cataract surgery. In such situations, the cost of the procedure can vary widely, based on market conditions and the fee schedule the surgeon adopts for a no-insurance, direct-pay scenario.

In the first half of 2017, the average cost of cataract surgery performed in the United States for someone without Medicare or private health insurance was €2,938 per eye while a patient with an insurance or covered by Medicare would have to pay €1,189 for the same cataract surgery (Serge, 2017).
To sum up, although the research and analysis of the cost in the healthcare sector seems to be a challenging and difficult issue to cope with, the results of such researches affect patient care and provider practices and support the management of the organizations. Health economic evaluation facilitates the comparisons within the economic costs and outcomes of medical interventions as a basis for deciding which medications and procedures to include in national Healthcare systems.
Health Related Quality of Life (HRQoL)

In this chapter the results of the statistic analysis of the EQ-5D-5L are being presented and a discussion upon the finding will try to pin point the relationship within variables and to what extent cataract surgery impacts the health related quality of patients’ life.

The data were used to assess the impact of cataract surgery on Health Related Quality of Life (HRQoL) through:

1. Presenting results from the EQ-5D-5L descriptive system as a health profile
2. Presenting results of the EQ VAS as a measure of overall self-rated health status
3. Presenting results from the EQ-5D-5L index value

Results

Regarding the sex of the sample, 51 were men and 49 were female. The sex of the sample was not deliberately selected; however the percentages of male and female are almost equal, 51% and 49% accordingly. The average age of the group was 74.4 years and the standard deviation (SD) 8.18 years. This high deviation is supported by the data that 27% of the sample was under 70 years old, between 50 and 70 years old while 73% of the people were above 70 years old between 71 and 88 years old.

On the following Table 5, the demographic data of the sample are presented:

Table 5: Demographics

<table>
<thead>
<tr>
<th>NAME</th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population of sample (N)</td>
<td>100</td>
</tr>
<tr>
<td>Female</td>
<td>49%</td>
</tr>
<tr>
<td>Male</td>
<td>51%</td>
</tr>
<tr>
<td>Average age</td>
<td>74.4 years old</td>
</tr>
<tr>
<td>Standard Deviation (SD) of age</td>
<td>8.18 years</td>
</tr>
<tr>
<td>Population 50-70 years old</td>
<td>27%</td>
</tr>
<tr>
<td>Population 71-88 years old</td>
<td>73%</td>
</tr>
</tbody>
</table>
Health profiles

In this section, the health profiles of the population will be presented through the proportions of reported problems for each dimension. This analysis will highlight in which dimensions the population presents more problems and to which the problems are less important.

Before treatment, the first three variables that is mobility, self-care and usual activities the percentage of the population that have no problems are above the 50% and especially for self-care and usual activities are very high 92% and 90% relatively. Mobility is the third variable with reported “no problems” 65%. The variables in which patients reported lower rates of “no problems” was pain/discomfort and anxiety/depression with 34% and 48% relatively, bellow 50%. The majority of patients in these two variables reported to have problems with the higher percentages being on level 2: slight problems (46% and 48% relatively).

After the surgery, percentages of “no problems” of mobility, self-care, usual activities and anxiety/depression increased while for pain/discomfort remained at the same level (Table 6).

Table 6: Percentage of a general population sample reporting levels 1 to 5 by dimension

<table>
<thead>
<tr>
<th>VARIABLE NAME</th>
<th>BEFORE TREATMENT</th>
<th>AFTER TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOBILITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 1</td>
<td>65%</td>
<td>67%</td>
</tr>
<tr>
<td>Level 2</td>
<td>20%</td>
<td>23%</td>
</tr>
<tr>
<td>Level 3</td>
<td>10%</td>
<td>8%</td>
</tr>
<tr>
<td>Level 4</td>
<td>5%</td>
<td>2%</td>
</tr>
<tr>
<td>Level 5</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>SELFCARE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 1</td>
<td>92%</td>
<td>94%</td>
</tr>
<tr>
<td>Level 2</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Level 3</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Level 4</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Level 5</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>USUAL ACTIVITIES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 1</td>
<td>90%</td>
<td>92%</td>
</tr>
<tr>
<td>Level 2</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Level 3</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Level 4</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Level 5</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>
If the 5 levels of the possible answers of questionnaire were dichotomized into two levels “no problems” and “problems”, some interesting information could be observed. The down-size of the answers into two categories is more convenient and helpful for the purposes of this research, because the numbers of reported problems is low and in most dimensions significantly lower than the “no problems” level and this presentation will stress the important difference in the two categories (EQ-5D-5L User Guide, 2015).

On the following Table 7, before the surgery the lowest rates of “no problems” are in the variable self-care, then in usual activities, then in mobility, where the “no problem” rates are higher that the “problems”. On the contrary, for pain/discomfort and for anxiety/depression the rates of “no problems” are lower that the “problems” with patients that reported problems are 66% and 78% relatively.

Table 7: Percentages of “no problems” and “problems” by dimension

<table>
<thead>
<tr>
<th></th>
<th>BEFORE TREATMENT</th>
<th>AFTER TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MOBILITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO PROBLEMS</td>
<td>65%</td>
<td>67%</td>
</tr>
<tr>
<td>PROBLEMS</td>
<td>35%</td>
<td>33%</td>
</tr>
<tr>
<td><strong>SELF CARE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO PROBLEMS</td>
<td>92%</td>
<td>94%</td>
</tr>
<tr>
<td>PROBLEMS</td>
<td>8%</td>
<td>6%</td>
</tr>
<tr>
<td><strong>USUAL ACTIVITIES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO PROBLEMS</td>
<td>90%</td>
<td>92%</td>
</tr>
<tr>
<td></td>
<td>PROBLEMS</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>----------</td>
<td>-----</td>
</tr>
<tr>
<td></td>
<td>10%</td>
<td>8%</td>
</tr>
<tr>
<td>PAIN/DISC.</td>
<td>NO PROBLEMS</td>
<td>34%</td>
</tr>
<tr>
<td></td>
<td>PROBLEMS</td>
<td>66%</td>
</tr>
<tr>
<td>ANX./DEP.</td>
<td>NO PROBLEMS</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td>PROBLEMS</td>
<td>78%</td>
</tr>
</tbody>
</table>

In the following Chart 3, there is a graphical presentation of the percentages of each dimension for the two levels of “no problems” and “problems” simultaneously for before and after the cataract surgery. These figures enable the recognition of the variables with higher percentages of problems at a glance.

One can notice that for the “no problems” category, the red column i.e. after treatment is higher than the blue column i.e. before surgery, in all of the variables. However the opposite happens for the “problems” category, where before surgery the percentages are higher so the blue column is higher than is the red column that represents the post operative percentages.

Chart 3: Percentages of “no problems” and “problems” pre & post surgery
T-Test analysis

The t-test resulted in which variables were statistically significant changed after the cataract surgery (P<0.05). In the t-test we compared the changes for all of the five dimensions of quality of life (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) in all of the five levels of possible answers (level 1-5) before and after the cataract surgery.

These variables are mobility (P=0.0012), anxiety/depression (P=0.0106), EQ-VAS (P=3.81134E-14), and Index Value (P=0.0060). In all of these variables the significance level (P) is lower than 0.05 which means that the levels (1-5) of all the variables before the surgery compared to the levels (1-5) of the all the variables after the surgery appear to have statistical significantly changed and had a positive impact in patients' health related quality of life.

Although the significance levels in patients’ self-care, usual activities and pain/discomfort after the cataract surgery were not statistically significant, it is worth to mention that also the change in these variables was in favor of patients. After the cataract surgery patients could take care of themselves better, usual activities were performed with less problems and patients were feeling less pain/discomfort. This argument is also supported by the increase in the index value after the surgery as it is analyzed afterwards (Table 8).

In the following Table 8, the abovementioned results that is the mean, the standard deviation and the T-test values, for all the variables (for answers of levels 1-5), before and after the cataract surgery, are presented:
Table 8: Mean, SD, before treatment (bf) and after treatment (af) and T-Test values, of Levels 1-5.

<table>
<thead>
<tr>
<th>VARIABLE NAME</th>
<th>MOBILITY</th>
<th>SELF-CARE</th>
<th>USUAL ACTIVITIES</th>
<th>PAIN/DISCOMFORT</th>
<th>ANXIETY/DEPRESSION</th>
<th>EQ-VAS</th>
<th>INDEX VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean bf.</td>
<td>1.54</td>
<td>1.15</td>
<td>1.18</td>
<td>1.88</td>
<td>2.18</td>
<td>72.97</td>
<td>0.745</td>
</tr>
<tr>
<td>SD (Standard Deviation) bf.</td>
<td>0.87</td>
<td>0.59</td>
<td>0.62</td>
<td>0.77</td>
<td>0.89</td>
<td>13.48</td>
<td>0.16</td>
</tr>
<tr>
<td>Mean af.</td>
<td>1.44</td>
<td>1.11</td>
<td>1.15</td>
<td>1.87</td>
<td>2.09</td>
<td>77.15</td>
<td>0.759</td>
</tr>
<tr>
<td>SD (Standard Deviation) af.</td>
<td>0.73</td>
<td>0.49</td>
<td>0.59</td>
<td>0.76</td>
<td>0.84</td>
<td>10.83</td>
<td>0.14</td>
</tr>
<tr>
<td>SIGNIFICANCE LEVEL P</td>
<td><strong>0.0012</strong></td>
<td>0.1027</td>
<td>0.0832</td>
<td>0.3197</td>
<td><strong>0.0106</strong></td>
<td>3.8113</td>
<td>0.0060</td>
</tr>
</tbody>
</table>

The average of mobility before treatment was 1.54 and became 1.44 after the treatment. The average of mobility decreased closer to level 1 after surgery that means patients had less “problems” in mobility.

Average of anxiety/depression was 2.18 before treatment and changed into 2.09 after treatment. Once more, the average of anxiety/depression has decreased which supports the argument that patients after cataract surgery felt less anxious and depressed.

The average numbers of these two variable decreased after the surgery closer to level “1: no problems”, which means that after cataract surgery patients had lower problems with mobility and lower levels of anxiety/depression.

The average of EQ-VAS was 72.97 before treatment and became 77.15 after the surgery. Accordingly, the average of the index value also changed after the cataract surgery. The index value was 0.745 before the surgery and changed to 0.759 after the surgery (Table 8).

The increases in EQ-VAS values depicts that patient’s perception for their health status has improved that means that patients after cataract surgery were feeling that their health was better and in higher level that it was before surgery. The
EQ VAS provides information about the patient’s subjective health perception, scored on a 20-cm visual analogue scale with endpoints labeled ‘the best health you can imagine’ and ‘the worst health you can imagine.’ The number 0 is the worst health in that the patient can imagine that he/she is at the moment whereas the number 100 is the best health that the patients thinks he/she is. Hence, the EQ-VAS value represents how the patient feels about his/her health despite other dimensions of quality.

Calculating how many patients answered that their EQ-VAS status have changed after the surgery, we found that 56% answered that they think that their health status have increased, and 46% that it remained the same and 0% that the value had decreased.

The following charts (Charts 5, Chart 6) depict the dispersion and line of the EQ-VAS before and after the cataract surgery. Looking closer at the graphs, one could recognize that before the surgery the average was below 80 whereas after the surgery the average is almost 80. The line increases that means the average number that depicts how the patients feel after the surgery also increases.
Chart 5: EQ-VAS values before treatment

Chart 6: EQ-VAS values after treatment
The increase in the index value from 0.745 to 0.759, suggests that the health state of patients after the cataract surgery has also increased. Patients reported that not only they felt better after the surgery but they could also perform better in all of the dimensions that are related with their health related quality of life and they had lower levels of pain and anxiety (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression).

The index value is based on the patient’s answers on all of the five dimensions that is the 5-digit number of his/her health state. This single summary index is calculated by applying a formula that attaches values (also called weights) to each of the levels in each dimension that can facilitate cost–utility analyses and the result is a number between 1 for the state “11111” “no problems” in all of the dimensions and −0.594 for the state “55555” that means the patients reported “extreme problems” in all dimensions. Therefore, the index value represents how the patient health is in an objective way that is derived by how well they perform in health quality dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression).

A relative increase in average numbers of index values is illustrated in the following two Charts 7 and 8, where there is a presentation of the Index values before and after cataract surgery. Index values have been increased after the treatment and the average number increased closer to 0.8. Patients after the cataract surgery reported that they actually had a better life quality, they could perform better at daily activities and they felt less pain and anxiety.
Chart 7: INDEX VALUE before Treatment

INDEX VALUE Before Treatment

Chart 7: INDEX VALUE after Treatment

INDEX VALUE After Treatment
Correlation analysis

Correlation with vision

In order to research whether there is a relationship between the perceptions of the patients about their self-rated health state (EQ-VAS values) before and after treatment and the change in their vision a chi-squared test was used. The same test was done for the correlation of differences in index value and change in vision.

Medical data about the patient vision before and one month after cataract surgery were taken (for the operated eye only). The patients’ vision on the eye that would be operated (before the cataract surgery) was compared with the vision in the operated eye after the surgery. The results were that in the entire sample the vision (best corrected visual acuity) in the operated eye increased after the cataract surgery. This finding is line with literature that supports that after cataract surgery the vision in increased (Davies, Pineda, 2017), (Lamourex et al, 2011).

The chi-squared test (Table 9), resulted in a significance level higher than 0.05 (P=0.4817 >0.05) that means that there is no correlation between the difference in the EQ-VAS values and the difference in vision in operated eye after the cataract surgery. The fact that there is no correlation between the change in EQ-VAS and the change in vision means that the patient thinks that he/she health is better after the cataract surgery but this is not due to the fact that his/her vision increased.

Table 9: Chi-squared test between difference in operated eye and difference in EQ_VAS

<table>
<thead>
<tr>
<th>Significance level (P)</th>
<th>P = 0.4817</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation coefficient R²</td>
<td>0.071</td>
</tr>
</tbody>
</table>

However, there is a correlation between difference in index value and increase in vision (Table 10). The correlation coefficient is moderate and positive. This positive correlation between the change in index value and increase in vision suggests that cataract surgery have a positive impact of the patients’ health quality.
Table 10: Chi-squared test between difference in operated eye and difference in Index Value

<table>
<thead>
<tr>
<th>Significance level (P)</th>
<th>P = 0.0001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation coefficient $R^2$</td>
<td>0.56</td>
</tr>
</tbody>
</table>

Correlation among dimensions

In order to discover which the variables (dimensions) have a correlation with the Index value, the EQ-VAS value, and the other statistically significant variables, the mobility and the anxiety/depression, a Spearman rank correlation coefficient analysis (correlation coefficient ranks between -1 and 1) will be presented, to identify the strength and the direction of the relationship within the variables. For all of the variables the analysis has been made for their differences before and after cataract surgery.

The changes in the mobility before and after the cataract surgery has a statistically significant correlation with the differences in usual activities, pain/discomfort, anxiety/depression, EQ-VAS and index value, after the treatment.

When the mobility increases, the patient has fewer problems in usual activities and lower levels of anxiety/depression, suffers less pain/discomfort and can better care him/herself. Furthermore, the increased mobility make the patient rate the EQ-VAS value higher in the self-rated scale which means that patients feel better after the treatment and it also results in a higher index value that means that patients are actually at a better health state. However, the relationship of mobility with activity, pain/discomfort, anxiety/depression and EQ VAS are weak, as depicted in the correlation coefficient that are below 0.50, which means that the relationship between them is not very strong.

The relationship with the index value is strong because is closer to -1. The correlation coefficient with the EQ-VAS and with the Index value is negative, because as mobility decreases closer to the level “1: no problems” the patient’s health state (index value) and the self rated health status (EQ-VAS) increases (Table 11).
Table 11: Correlation for Mobility

<table>
<thead>
<tr>
<th>Variable</th>
<th>USUAL ACTIVITIES</th>
<th>PAIN/DISCOMFORT</th>
<th>ANX.-DEPR</th>
<th>EQ-VAS</th>
<th>INDEX VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOBILITY</td>
<td>Correlation coefficient</td>
<td>0.332</td>
<td>0.302</td>
<td>0.306</td>
<td>-0.23</td>
</tr>
<tr>
<td></td>
<td>Significance Level P</td>
<td>0.0007</td>
<td>0.0023</td>
<td>0.002</td>
<td>0.0211</td>
</tr>
</tbody>
</table>

Anxiety/depression has a positive, although weak, relationship with mobility and pain/discomfort and a strong negative relationship with index value. As the anxiety/depression after the cataract decreases the patient’s mobility increases, pain/discomfort decreases and health state increases (Table 12).

Table 12: Correlation for Anxiety/depression

<table>
<thead>
<tr>
<th>Variable</th>
<th>MOBILITY</th>
<th>PAIN/DISCOMFORT</th>
<th>INDEX VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANXIETY/DEPRESSION</td>
<td>Correlation coefficient</td>
<td>0.306</td>
<td>0.39</td>
</tr>
<tr>
<td></td>
<td>Significance Level P</td>
<td>0.002</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

EQ-VAS Value has a weak negative relationship with mobility and self-care. The EQ-VAS is also correlated with index value with a weak positive relationship. The increase in EQ-VAS values means that patient feels better when the problems in mobility and self-care are less. When the patient has a better health state (index value), the score in the self-rated health status (EQ-VAS) is also higher. The patient is actually better and he/she feels that he/she is better (Table 13).

Table 13: Correlation for EQ-VAS

<table>
<thead>
<tr>
<th>Variable</th>
<th>MOBILITY</th>
<th>SELFCARE</th>
<th>INDEX VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQ-VAS</td>
<td>Correlation coefficient</td>
<td>-0.23</td>
<td>-0.211</td>
</tr>
<tr>
<td></td>
<td>Significance Level P</td>
<td>0.0211</td>
<td>0.0348</td>
</tr>
</tbody>
</table>

The Index Value is correlated with all of the five variables in a negative relationship; also the index value is positively correlated with the EQ-VAS. As the problems decrease the health state increases. However, the stronger relationship of index value is with mobility and anxiety/discomfort. The mobility and the psychological factors seem to highly affect the quality of patient’s health.
The higher index value when the values of the variables decreases closer to “no problems” level can be easily understood by the fact that the index value derives from the combination of the answers in the variables. **The patient’s quality of life increases after cataract surgery, as he/she has fewer problems in mobility, self-care, usual activities, feels less pain/discomfort and has less anxiety/depression and in addition he/she thinks his/her life is better** (Table 14).

### Table 14: Correlation for INSEX VALUE

<table>
<thead>
<tr>
<th>Variable</th>
<th>MOBILITY</th>
<th>SELFCARE</th>
<th>ACTIVITY</th>
<th>PAIN/DIS</th>
<th>ANX./DEPR</th>
<th>EQ VAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDEX VALUE</td>
<td>Correlation coefficient</td>
<td>-0.727</td>
<td>-0.436</td>
<td>-0.38</td>
<td>-0.253</td>
<td>-0.644</td>
</tr>
<tr>
<td>Significance Level P</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>0.0001</td>
<td>0.0112</td>
<td>&lt;0.0001</td>
<td>0.006</td>
</tr>
</tbody>
</table>

**Summary of results of the Health Related Quality of Life**

The cataract patients of this study reported having higher problems in physiological factors such as anxiety/depression and higher levels of pain/discomfort. Also they reported slight problems in their mobility, with the majority not having problems in walking. The majority of the patients had no problems at self care, and usual activities.

The results support the fact that the average EQ-VAS value has increased after the surgery which means that **patients felt that their general health status has increased** after the treatment.

The index value after the cataract surgery has increased which means the health state of the patient increased that is the **quality of life of these patients has increased**.

Consequently, for this specific sample, the **cataract surgery had positively affected the patients’ mobility, anxiety/depression, EQ-VAS value** how patient feels and finally the **Index value that expresses the health quality**. The variables self-care, usual activities and pain/discomfort does not proved to be statistically significant.
therefore the cataract surgery seems not to affect them significantly but also these variables increased after surgery.

In addition, the increase in vision acuity after cataract surgery positively affected the quality of patients’ life. The patients could perform better in daily activities and also be at a better psychological health state. Overall, the cataract surgery had a positive impact in health related quality of life (HRQoL) of cataract patients.

The outcomes of this research are supported by literature that the improvements in vision after cataract surgery has a considerable positive impact on patients’ real life activities, emotional and social life components and in general in patients’ health related quality of life (Lamourex, et al, 2011) (Ka A.M., et al, 2017).
Conclusions

This research has tried to highlight the connection between the quality in the service provided and the quality in the patient’s health, for the case of patients that have cataract surgery in UEC. The focus nowadays, is treat patient with a holistic approach to health care management according to which quality is the issue not only on the medical outcome but also on the process through which the service is provided.

A health care organizations is vital to continuous improve the process of the services that are being provided. There are several tools that can contribute to the enhancement of the service design. In a changing environment, one of the most challenging issues in health care is to design personalized disease management in order to meet patient’s needs and expectations.

Cataract surgery has a high impact in health related quality of patients and affects many variables of the daily life of the patient. Therefore it is important for health providers to mitigate any risks and inconsistencies in the process of the medical service that is provided.

In addition, the cost burden of a cataract surgery is high although the cost-utility analysis is positive, a fact that implies that this treatment should be covered by the national health care systems.

At UEC, the impact of cataract surgery on patients’ quality of life proved to be significantly positive, and increase their health related quality of life (HRQoL). However, the process of the cataract surgery, the steps that a patient follows in order to have this treatment, could become more efficient through implementation of several managerial instruments and especially the ISO 9001:2015 management quality standard. Quality in service design could be improved in order to meet patient’s expectations, and make the patient’s pathway to treatment more unobtrusive.
References


Ερωτηματολόγιο σχετικά με την υγεία

Ελληνική έκδοση για την Ελλάδα

*(Greek version for Greece)*

**ΚΕΙΜΕΝΟ ΓΙΑ ΤΗΛΕΦΩΝΙΚΗ ΣΥΝΕΝΤΕΥΞΗ**

**ΓΕΝΙΚΗ ΕΙΣΑΓΩΓΗ**

Συνιστάται στο άτομο που θέτει τις ερωτήσεις τηλεφωνικώς να τηρήσει το κείμενο του EQ-5D. Αν και θα πρέπει να ληφθεί υπόψη το στυλ ομιλίας του ατόμου που θέτει τις ερωτήσεις, η διατύπωση των οδηγιών του ερωτηματολογίου θα πρέπει να τηρηθεί όσο το δυνατόν πιο πιστά. Στην περίπτωση του περιγραφικού συστήματος στις σελίδες 2 και 3 του EQ-5D, θα πρέπει να τηρηθεί η ακριβής φρασεολογία.

Συνιστάται στο άτομο που θέτει τις ερωτήσεις να έχει μπροστά του ένα αντίγραφο του EQ-5D καθώς θα θέτει τις ερωτήσεις μέσω τηλεφώνου. Αυτό επιτρέπει στο άτομο που θέτει τις ερωτήσεις να καταχωρεί απευθείας τις απαντήσεις του ερωτηθέντα στο EQ-5D (π.χ., να σημειώσει τα αντίστοιχα πλαίσια στις σελίδες 2 και 3 και στην κλίμακα της σελίδας 4, στο σημείο που υποδεικνύει την ισχύ της υγείας σήμερα). Ο ερωτηθείς πρέπει επίσης να έχει μπροστά του ένα αντίγραφο του EQ-5D για αναφορά. Εάν ο ερωτηθείς ζητήσει διευκρίνιση, το άτομο που θέτει τις ερωτήσεις μπορεί να τον βοηθήσει ανανυώνοντας την ερώτηση λέξη προς λέξη. Το άτομο που θέτει τις ερωτήσεις δεν θα πρέπει να προσπαθήσει να δώσει τη δική του ή τη δική της εξήγηση, αλλά θα πρέπει να προτείνει στον ερωτηθέντα να χρησιμοποιήσει τη δική του ή τη δικής της ερμηνεία.

Εάν ο ερωτηθείς αντιμετωπίζει δυσκολία να σημειώσει κάποιο από τα πλαίσια, το άτομο που θέτει τις ερωτήσεις θα πρέπει να επαναλάβει την ερώτηση λέξη προς λέξη και να ζητήσει από τον ερωτηθέντα να απαντήσει με τέτοιο τρόπο ο οποίος θα αντικατοπτρίζει περισσότερο τις δικές του ή δικές της σκέψεις σχετικά με την υγεία του ή την υγεία της σήμερα.
ΕΙΣΑΓΩΓΗ ΣΤΟ EQ-5D

(Σημείωση στο άτομο που θέτει τις ερωτήσεις: διαβάστε το ακόλουθο κείμενο στον ερωτηθέντα)

Θέλουμε να ενημερωθούμε για την άποψή σας σχετικά με την υγεία σας. Θα σας θέσω πρώτα ορισμένες απλές ερωτήσεις σχετικά με την υγεία σας ΣΗΜΕΡΑ. Κατόπιν θα σας ζητήσω να βαθμολογήσετε την υγεία σας σε μία κλίμακα μέτρησης. Θα σας εξηγήσω στην πορεία τι πρέπει να κάνετε, αλλά παρακαλώ διακόψτε με εάν δεν καταλαβαίνετε κάτι ή εάν επιθυμείτε να διευκρινιστεί κάτι. Παρακαλείσθε επίσης να λάβετε υπόψη ότι δεν υπάρχουν σωστές ή λάθος απαντήσεις. Ενδιαφέρομαστε μόνο για την προσωπική σας άποψη.

ΠΕΡΙΓΡΑΦΙΚΟ ΣΥΣΤΗΜΑ EQ-5D: ΕΙΣΑΓΩΓΗ

Θα σας διαβάσω πρώτα ορισμένες ερωτήσεις. Η κάθε ερώτηση περιλαμβάνει πέντε επιλογές απαντήσεων. Παρακαλώ πείτε μου ποια απάντηση περιγράφει καλύτερα την υγεία σας ΣΗΜΕΡΑ. Μην επιλέξετε πάνω από μία απάντηση για κάθε ομάδα ερωτήσεων.

(Σημείωση για το άτομο που θέτει τις ερωτήσεις: ενδέχεται να χρειαστεί να υπενθυμίζετε τακτικά στον ερωτηθέντα ότι οι ερωτήσεις αφορούν την υγεία του ΣΗΜΕΡΑ. Ενδέχεται επίσης να χρειαστεί να επαναλάβετε τις ερωτήσεις λέξη προς λέξη)

ΠΕΡΙΓΡΑΦΙΚΟ ΣΥΣΤΗΜΑ EQ-5D

ΚΙΝΗΤΙΚΟΤΗΤΑ

Πρώτον, θα ήθελα να σας ρωτήσω σχετικά με την κινητικότητά σας. Θα λέγατε ότι:

1. Δεν έχετε κανένα πρόβλημα στο περπάτημα; ☐
2. Έχετε μικρά προβλήματα στο περπάτημα; ☐
3. Έχετε μέτρια προβλήματα στο περπάτημα; ☐
4. Έχετε σοβαρά προβλήματα στο περπάτημα; ☐
5. Δεν μπορείτε καθόλου να περπατήσετε; ☐

(Σημείωση για το άτομο που θέτει τις ερωτήσεις: σημειώστε το κατάλληλο πλαίσιο στο ερωτηματολόγιο EQ-5D)

ΑΥΤΟΕΞΥΠΗΡΕΤΗΣΗ

Στη συνέχεια θα ήθελα να σας ρωτήσω σχετικά με την αυτοεξυπηρέτησή σας. Θα λέγατε ότι:

1. Δεν έχετε κανένα πρόβλημα να πλένεστε και να ντύνεστε; ☐
2. Έχετε μικρά προβλήματα στο να πλένετε ή να ντύνετε; ☐
3. Έχετε μέτρια προβλήματα στο να πλένετε ή να ντύνετε; ☐
4. Έχετε σοβαρά προβλήματα στο να πλένετε ή να ντύνετε; □
5. Δεν μπορείτε καθόλου να πλένετε και να ντύνετε; □

(Σημείωση για το άτομο που θέτει τις ερωτήσεις: σημείωστε το κατάλληλο πλαίσιο στο ερωτηματολόγιο EQ-5D)

ΣΥΝΘΕΣΜΕΝΕΣ ΔΡΑΣΤΗΡΙΟΤΗΤΕΣ
Στη συνέχεια θα ήθελα να σας ρωτήσω για θέματα που σχετίζονται με τις συνηθισμένες δραστηριότητες. Θα λέγατε ότι:

1. Δεν έχετε κανένα πρόβλημα στο να εκτελείτε τις συνηθισμένες σας δραστηριότητες; □
2. Έχετε μικρά προβλήματα στο να εκτελείτε τις συνηθισμένες σας δραστηριότητες; □
3. Έχετε μέτρια προβλήματα στο να εκτελείτε τις συνηθισμένες σας δραστηριότητες; □
4. Έχετε σοβαρά προβλήματα στο να εκτελείτε τις συνηθισμένες σας δραστηριότητες; □
5. Δεν μπορείτε καθόλου να εκτελείτε τις συνηθισμένες σας δραστηριότητες; □

(Σημείωση για το άτομο που θέτει τις ερωτήσεις: σημείωστε το κατάλληλο πλαίσιο στο ερωτηματολόγιο EQ-5D)

ΠΟΝΟΣ/ΔΥΣΦΟΡΙΑ
Στη συνέχεια θα ήθελα να σας ρωτήσω για θέματα που σχετίζονται με πόνο ή δυσφορία. Θα λέγατε ότι:

1. Δεν έχετε καθόλου πόνο ή δυσφορία; □
2. Έχετε μικρό πόνο ή δυσφορία; □
3. Έχετε μέτριο πόνο ή δυσφορία; □
4. Έχετε σοβαρό πόνο ή δυσφορία; □
5. Έχετε υπερβολικό πόνο ή δυσφορία; □

(Σημείωση για το άτομο που θέτει τις ερωτήσεις: σημείωστε το κατάλληλο πλαίσιο στο ερωτηματολόγιο EQ-5D)

ΑΓΧΟΣ/ΘΛΙΨΗ
Τέλος θα ήθελα να σας ρωτήσω για ζητήματα σχετικά με το άγχος ή τη θλίψη. Θα λέγατε ότι:

1. Δεν έχετε άγχος ή θλίψη; □
2. Έχετε λίγο άγχος ή θλίψη; □
3. Έχετε μέτριο άγχος ή θλίψη; □
4. Έχετε σοβαρό άγχος ή θλίψη; □
5. Έχετε υπερβολικό άγχος ή θλίψη? [ ]

(Σημείωση για το άτομο που θέτει τις ερωτήσεις: σημειώστε το κατάλληλο πλαίσιο στο ερωτηματολόγιο EQ-5D)
Η χειρότερη υγεία που μπορείτε να φανταστείτε

EQ VAS: ΕΙΣΑΓΩΓΗ

(Σημείωση για το άτομο που θέτει τις ερωτήσεις: Εάν είναι δυνατόν, ίσως να είναι χρήσιμο να στείλετε βοηθητικό έντυπο υλικό (δηλ. το EQ VAS) πριν από την τηλεφωνική συνδιάλεξη ώστε να το έχουν μπροστά τους οι ερωτηθέντες όταν συμπληρώνουν αυτή την εργασία)

Τώρα, θα ήθελα να σας ζητήσω να μου πείτε πόσο καλή ή κακή είναι η υγεία σας ΣΗΜΕΡΑ.

Θα ήθελα να προσπαθήσετε να φανταστείτε μια κλίμακα, κάτι σαν ένα θερμόμετρο. Μπορείτε να το κάνετε αυτό; Η καλύτερη υγεία που μπορείτε να φανταστείτε έχει βαθμό 100 (εκατό) στο πάνω μέρος της κλίμακας και η χειρότερη υγεία που μπορείτε να φανταστείτε έχει βαθμό 0 (μηδέν), στο κάτω μέρος της κλίμακας.

EQ VAS: ΕΡΓΑΣΙΑ

Θα ήθελα τώρα να μου πείτε σε ποιο σημείο αυτής της κλίμακας τοποθετείτε εσείς την υγεία σας σήμερα.

(Σημείωση για το άτομο που θέτει τις ερωτήσεις: σημειώστε στην κλίμακα το σημείο που δείχνει την «υγεία του ερωτηθέντα σήμερα». Τώρα, παρακαλούμε γράψτε τον αριθμό που σημειώσατε στην κλίμακα στο παρακάτω πλαίσιο)

Η ΥΓΕΙΑ ΤΟΥ ΕΡΩΤΗΘΟΝΤΑ

Σας ευχαριστούμε για το χρόνο που διαθέσατε για να απαντήσετε αυτές τις ερωτήσεις.

Η καλύτερη υγεία που μπορείτε να φανταστείτε

Η χειρότερη υγεία που μπορείτε να φανταστείτε
Appendix A2: E-mail from EUROQUOL

GB
Gerben Bakker <bakker@euroqol.org>

Reply|
Wed 11/8, 4:48 PM
You;
Anita Dwarkasing (dwarkasing@euroqol.org)
You replied on 11/9/2017 10:19 AM.
Dear Katerina,

I’d like to inform you that there are two methods for analyzing 5L data:
- Interim scoring by means of the crosswalk;
- Applying directly elicited value sets.

We have both options available for various countries, but not for Greece. On our website the directly elicited value sets are listed: https://euroqol.org/eq-5d-instruments/eq-5d-5l-about/valuation/

In the absence of a country specific value set we recommend to apply the value set of a nearby / similar country or the most frequently used value set (UK).

Please let me know how you’d like to proceed.

Best regards,

Gerben Bakker
User Support Officer
EuroQol Research Foundation

T +31 88 4400189 | E bakker@euroqol.org | www.euroqol.org | Marten Meesweg 107 | 3068 AV Rotterdam The Netherlands
Appendix A3: Symbols/Notes in flowchart

- One step in the process/operation

- Direction of flow from one step or decision to another.

- Decision based on a question.

- Start and end points

Notes on the Flowchart:

- The appointment is booked only via telephone.

- At the day of the appointment, the patient registers at the hospital’s central reception and takes his medical record (the original hardcopy) and handles it to the nurse in charge in outpatients. The patient waits until the nurse calls him/her name.

- The ophthalmologist performs an ophthalmic examination (in the outpatients in the ground floor) to confirm the diagnosis and discusses the refractive aim of the surgery with the patient.

- Ultrasound biometry is conducted, by the resident in charge in the clinic, to predict the correct lens implant power. The equipment for biometry is in the clinic that is in the 2nd floor. The preparation for surgery is made by the nurses and the resident in the clinic.

- Post operative instructions and prescription as well as the follow-up appointment, are done by the ophthalmologist (surgeon). The resident in clinic prepares the paperwork work for the patient’s discharge.

- The patient or family has to stamp documentation to the relative office (at first floor) before leaving.