



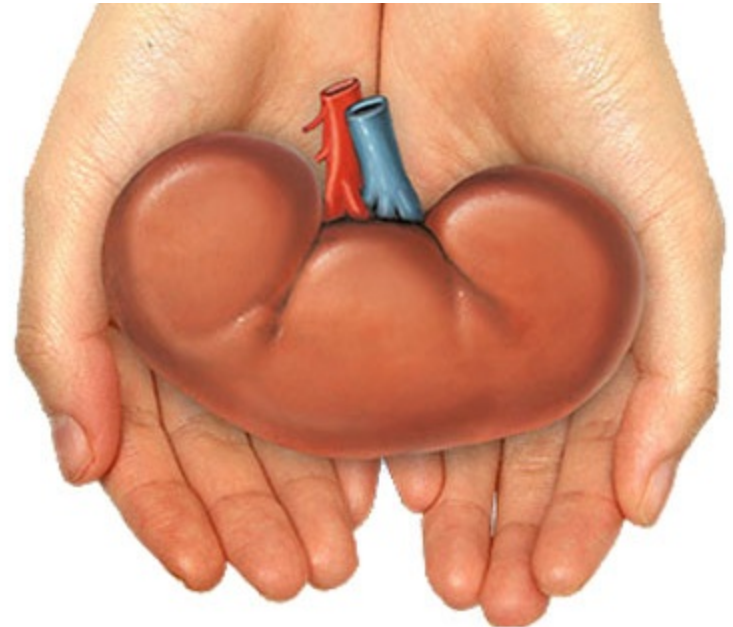
INTERNATIONAL SYMPOSIUM ON THE ANALYTIC HIERARCHY PROCESS

SELECTION OF BEST HOSPITAL FOR KIDNEY
TRANSPLANTATION USING AHP: A CASE FOR
TURKEY

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1. INTRODUCTION

- In Turkey, kidney transplantation assignments are performed by the National Coordination System (NCS). The database obtains organ and tissue donations, transplantations records, receivers, and donor information from hospitals.
- Patients have to wait for a long time because of some criteria such as shortage of donors, medical urgency, age, blood group, matching of specific tissue/blood characteristics, dialysis time obtained from the database.
- Currently, there are 72 kidney transplantation centers in Turkey. Turkey takes place in an excellent position in the number of transplants from living donors due to strong relative bonds.
- There are roughly 22,981 kidney patients in Turkey registered on a central waiting list for transplantation from live or cadaver kidney based on a 2019 Health Ministry report. In this point, selection the best hospital for kidney surgery in terms of patients and their relatives, it has vital importance because all patients have one or less chance to get a healthy kidney (Url1).
- Measuring healthcare service performance can be a complicated mission as it has multiple functions to achieve overall goals. Many complicated problems are successfully solved with the Analytical Hierarchy Process (AHP) method in health-care systems.
- This study's scope concentrates on, for kidney transplantation, selecting the best hospital concerning the quality of health care service parameters compared with three hospitals in Istanbul.



2. LITERATURE REVIEW

- Analytic Hierarchy Process (AHP) method which was developed by Saaty (1977, 1996) as a multi criteria decision making tool
- Cheng-Ru Wu et. al. draw attention to selection a best location to ensure a competitive advantage by using AHP method which was integrated to Porter's Diamond Model
- Hima Gupta integreated AHP method for selection of best hospital for surgery in Ghana among Max, Apollo and Fortis hospitals
- Integrated SERVQUAL and AHP method is implemented to many service industries such as healthcare, transportation, education, and safety (Yucesan and Gul, 2020).



- Similar to this study, Aktas et al. (2015) considered a list of criteria gathered from the literature to classify the hospitals based on an MCDM methodology outcomes.
- In the current literature, there is still no attempt to evaluate service quality performance of health-care systems from the viewpoint patients and relatives who suffers from kidney failure.
- As differ from the literature, the study aims to decide best hospital for kidney transplantation from living donor to patient using AHP in terms of location of selected hospitals, quality of treatment, medical staff, information flow between staff and patients, success rate of transplantation, and selection of equipment for surgery of kidney etc.



3. THE OBJECTIVE OF THE STUDY

- In this study, selection of best hospital for kidney transplantation by using AHP technique is considered for the hospitals in the city of Istanbul, Turkey.
- The main goal is choosing the best hospital among three alternatives, such as Florence Nightingale, Memorial, and Medicana Şişli Hospitals, for kidney transplantation using the AHP method.
- The assumption, no dependency between the criteria, is considered. The main criteria are that tangibles, reliability, responsiveness, and empathy. For example, the first main tangible criterion has four sub-criteria such as modern equipment, physical facilities, cleanliness, and value for money. All criteria and sub-criteria were determined based on the Aktas et al. (2015) research.
- Through that, a hierarchical structure is constructed for the solution of the problem.



4. CONSTRUCTING THE DECISION MODEL

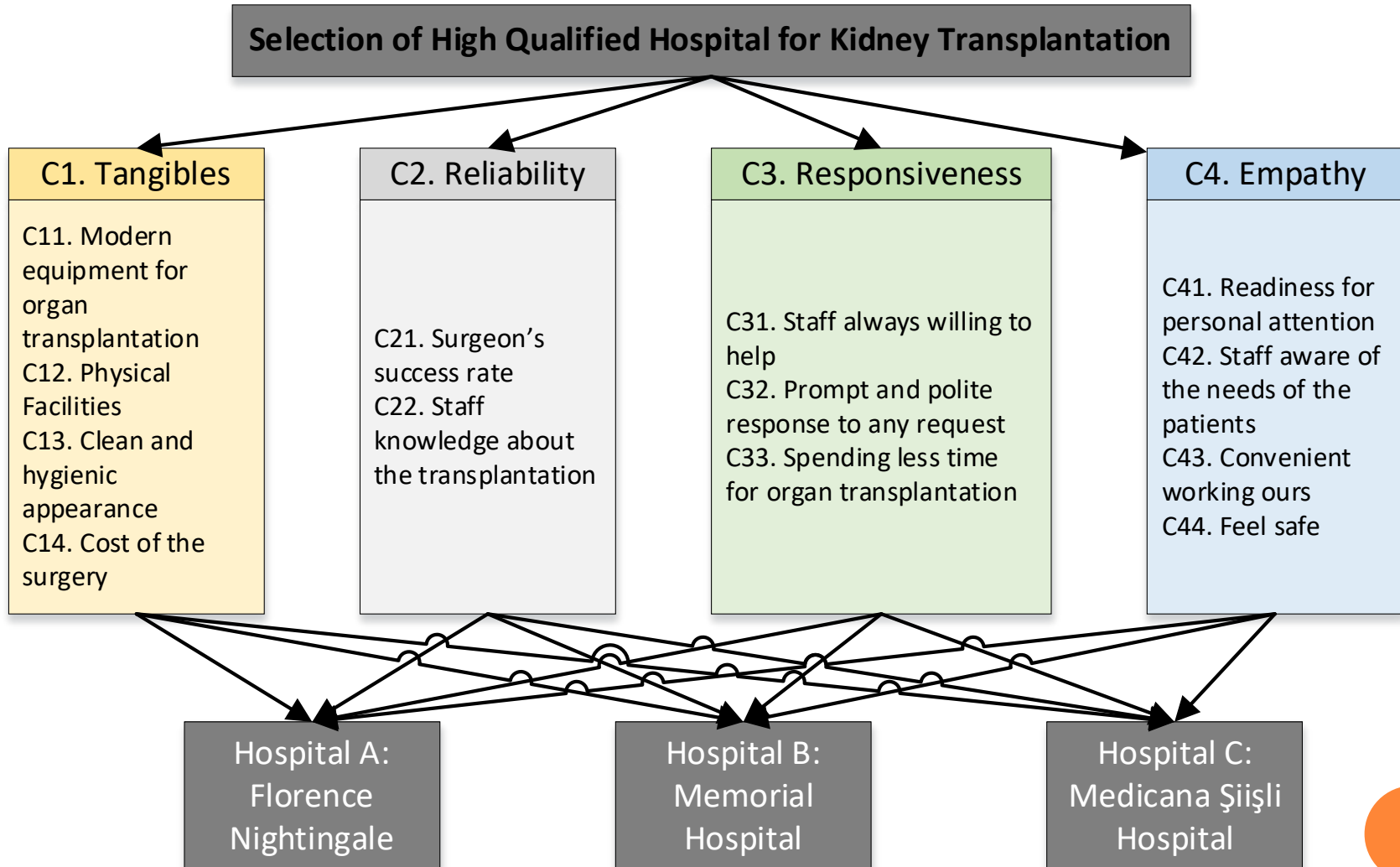


Figure 1. Structure of the method used for case study

4. CONSTRUCTING THE DECISION MODEL

Q1. Which criteria can be used for evaluating “Selection of Best Hospital in Istanbul for Kidney Transplantation from Living Donor to Patient using AHP” has more importance than others?

1=Equal 3=Moderately more important 5= Strongly More important 7=very strongly More important 9=Extremely More important																		
Tangibles	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Reliability
Tangibles	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Responsiveness
Tangibles	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Empathy
Reliability	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Responsiveness
Reliability	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Empathy
Responsiveness	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Empathy



Q2. With respect to modern equipment, which hospital can be selected by patients?

1=Equal 3=Moderately more important 5= Strongly More important 7=very strongly More important 9=Extremely More important	
Florence Nightingale Hospital	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9 Memorial Hospital
Memorial Hospital	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9 Medicana Şişli Hospital
Medicana Şişli Hospital	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9 Florence Nightingale Hospital



PAIRWISE COMPARISONS

Table 1: Comparisons with main criteria (Q1)

Inconsistency	Tangibles	Reliability	Responsiveness	Empathy
Tangibles	1	1/1.58	1.64	1.89
Reliability	1.58	1	1.93	2.01
Responsiveness	1/1.64	1/1.93	1	1.72
Empathy	1/1.89	1/2.01	1/1.72	1

Table 2: Comparisons with alternatives in terms of modern equipment (Q2)

Inconsistency	Florence Nightingale Hospital	Memorial Hospital	Medicana Şişli Hospital
Florence Nightingale Hospital	1	1.95	1.61
Memorial Hospital	1/1.95	1	1/1.7599
Medicana Şişli Hospital	1/1.61	1.7599	1

Table 3: Comparisons with alternatives in terms of Physical Facilities (Q3)

Inconsistency	Florence Nightingale Hospital	Memorial Hospital	Medicana Şişli Hospital
Florence Nightingale Hospital	1	1.76	1.76
Memorial Hospital	1/1.76	1	1
Medicana Şişli Hospital	1/1.76	1	1

Table 4: Comparisons with alternatives in terms of Clean and Hygienic Appearance(Q4)

Inconsistency	Florence Nightingale Hospital	Memorial Hospital	Medicana Şişli Hospital
Florence Nightingale Hospital	1	1	1
Memorial Hospital	1	1	1
Medicana Şişli Hospital	1	1	1



Table 5: Comparisons with alternatives in terms of cost of the surgery(Q5)

Inconsistency	Florence Nightingale Hospital	Memorial Hospital	Medicana Şişli Hospital
Florence Nightingale Hospital	1	1/2.09	1/1.78
Memorial Hospital	2.09	1	1/1.84
Medicana Şişli Hospital	1.78	1.84	1

Table 6: Comparisons with alternatives in terms of Surgeon's success rate(Q6)

Inconsistency	Florence Nightingale Hospital	Memorial Hospital	Medicana Şişli Hospital
Florence Nightingale Hospital	1	2.09	2.09
Memorial Hospital	1/2.09	1	1
Medicana Şişli Hospital	1/2.09	1	1



Table 7: Comparisons with alternatives in terms of Staff Knowledge about Kidney Transplantation (Q7)

Inconsistency	Florence Nightingale Hospital	Memorial Hospital	Medicana Şişli Hospital
Florence Nightingale Hospital	1	1.78	1.84
Memorial Hospital	1/1.78	1	1.4
Medicana Şişli Hospital	1/1.84	1/1.4	1

Table 8: Comparisons with alternatives in terms of Friendly staff (Q8)

Inconsistency	Florence Nightingale Hospital	Memorial Hospital	Medicana Şişli Hospital
Florence Nightingale Hospital	1	1	1
Memorial Hospital	1	1	1
Medicana Şişli Hospital	1	1	1



Table 9: Comparisons with alternatives in terms of Prompt and Polite Response to patient's needs(Q9)

Inconsistency	Florence Nightingale Hospital	Memorial Hospital	Medicana Şişli Hospital
Florence Nightingale Hospital	1	1.8	1.9
Memorial Hospital	1/1.8	1	1.58
Medicana Şişli Hospital	1/1.9	1/1.58	1

Table 10: Comparisons with alternatives in terms of Reasonable Waiting Time (Q10)

Inconsistency	Florence Nightingale Hospital	Memorial Hospital	Medicana Şişli Hospital
Florence Nightingale Hospital	1	1	1
Memorial Hospital	1	1	1
Medicana Şişli Hospital	1	1	1



Table 11: Comparisons with alternatives in terms of Readiness for Personal Attention (Q11)

Inconsistency	Florence Nightingale Hospital	Memorial Hospital	Medicana Şişli Hospital
Florence Nightingale Hospital	1	2.09	1.85
Memorial Hospital	1/2.09	1	1/1.71
Medicana Şişli Hospital	1/1.85	1.71	1

Table 12: Comparisons with alternatives in terms of Staff aware of the needs of the patients (Q12)

Inconsistency	Florence Nightingale Hospital	Memorial Hospital	Medicana Şişli Hospital
Florence Nightingale Hospital	1	1.91	1.71
Memorial Hospital	1/1.91	1	1/1.48
Medicana Şişli Hospital	1/1.71	1.48	1



Table 13: Comparisons with alternatives in terms of Convenient Working Hours and Feel safe (Q13 and Q14)

Inconsistency	Florence Nightingale Hospital	Memorial Hospital	Medicana Şişli Hospital
Florence Nightingale Hospital	1	1	1
Memorial Hospital	1	1	1
Medicana Şişli Hospital	1	1	1

Table 14: Comparisons with sub-criteria in terms of Tangibles (Q15)

Inconsistency	Modern Equipment	Physical Facilities	Clean and Hygienic	Cost of the surgery
Modern Equipment	1	2.75	2.77	3.14
Physical Facilities	1/2.75	1	1	2.54
Clean and Hygienic	1/2.75	1	1	1.58
Cost of the surgery	1/3.14	1/2.54	1/1.58	1

Table 15: Comparisons with sub-criteria in terms of Empathy (Q16)

Inconsistency	Readiness for personal attention	Staff aware of the needs of the patients	Convenient working hours	Feel safe (Security)
Readiness for personal attention	1	1	1.88	1/3.14
Staff aware of the needs of the patients	1	1	1.88	3.14
Convenient working hours	1/1.88	1/1.88	1	3.64
Feel safe	3.14	1/3.14	1/3.64	1



Table 16: Comparisons with sub-criteria in terms of Reliability (Q17)

Inconsistency	Surgeon's Success Rate	Staff Knowledge
Surgeon's success rate	1	3.74
Staff Knowledge	1/3.74	1

Table 17: Comparisons with sub-criteria in terms of Responsiveness (Q18)

Inconsistency	Friendly Staff	Prompt and Polite service	Reasonable waiting time
Friendly Staff	1	1.64	1.8
Prompt and Polite service	1/1.64	1	1.72
Reasonable waiting time	1/1.8	1/1.72	1



5. DATA ANALYSIS

Table 18. AHP results

Alternative	Weight	Ranking
Hospital A	0.439	1
Hospital B	0.272	3
Hospital C	0.289	2

The best hospital for kidney transplantation is Florence Nightingale Hospital in terms of service quality is about four dimensions: tangibles, responsiveness, reliability, and empathy. When looking at the results, it cannot be said Memorial and Medicana Hospitals have significant differences concerning priorities. However, still, Medicana Hospital is better than Memorial with a little difference.



6. LIMITATIONS

- In this study, it was challenging to find a patient who knows three hospitals' service quality at the same time.
- Because of this issue, just 42 patients were attended in the survey. These data were not adequate.
- Furthermore, the data collection method was also tricky. Some sub-criteria have the same meaning in terms of patients. These questions can be removed for further researches.
- All alternatives have strength competency, may be can compared with public and private hospitals under same rules



7. CONCLUSIONS AND FURTHER SUGGESTIONS

- This study constructed the analytical hierarchy process (AHP) to evaluate the hospital service quality for kidney transplantation in Istanbul. There are three private competing hospitals and various competing criteria for choosing the most suitable one.
- Service quality parameters are determined in the light of four servqual dimensions, and significance levels are obtained using the analytic hierarchy process (AHP) in terms of patients and relatives. A survey was conducted and 21 patients and their relatives attended this survey.
- For solving hierarchical model, Super Decisions Software was used.
- The results show that the best hospital for Kidney transplantation is selected Florence Nightingale Hospital in terms of service quality about four dimensions which are tangibles, responsiveness, reliability and empathy.
- For future research, the number of alternatives, criteria and attendees of the survey can be increased.



- At the end of the all calculations, the best hospital for Kidney transplantation is selected Florence Nightingale Hospital in terms of service quality about four dimensions which are tangibles, responsiveness, reliability and empathy and also Medicana Hospital is better than Memorial with a little priority difference
- Shortage of data, Difficult to find patients who know all three hospitals
- Some sub-criteria has same meaning in terms of patients. These questions can be removed for the further suggestions
- All of alternatives has strenght competency, may be can compared with public and private hospitals under same rules



8. KEY REFERENCES

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