Nursing & Health Sciences

Nursing and Health Sciences (2013), **15**, 31–38

Research Article

Investigation of adaptation after liver transplantation using Roy's Adaptation Model

Yaprak S. Ordin, RN, MSc,[1] Özgül Karayurt, RN, PhD[1] and Sally Wellard, RN, PhD[2]
[1]*Department of Surgical Nursing, Dokuz Eylul University, Izmir, Turkey and* [2]*School of Health Sciences, University of Ballarat, Ballarat, Victoria, Australia*

Abstract In this study we explored the adaptation of transplant recipients in Turkey using the Roy Adaptation Model. A descriptive qualitative design was used with data collected from liver transplant recipients in either individual or group interviews between May 2009 and February 2010. Using deductive content analysis, four themes were identified in the data: physiological mode, self-concept mode, role function mode, and interdependence mode. Each theme included both adaptive and ineffective behaviors of liver transplant recipients. The findings of this study indicate that liver transplant recipients need information and support about their ineffective behaviors in all modes of the Roy Adaptation Model. The findings also support the use of a nursing model in the delivery of nursing care for liver transplantation recipients.

Key words adaptation, descriptive qualitative design, experience, liver transplantation, nursing, Roy Adaptation Model.

INTRODUCTION

Liver transplantation (LT) has become a treatment of choice for patients with end-stage liver disease, and is the most effective treatment for many patients with acute or chronic liver failure (Bufton *et al*., 2008). LT in Turkey began in 1988 (Turkish Transplantation Society – TTS, Türkiye Organ Nakli Derneği-TOND, 2012), and currently there are 23 transplantation centers, where a total of 592 LT were carried out in 2008. Turkey has a high rate of living related donation (66.5% of all LT) (The Ministry Health of Turkey, 2008) in contrast with the USA, where less than 0.5% of all donor livers come from living donors (OPTN, 2010). Liver living donors in Turkey are mostly first-degree relatives, such as parents, siblings, or children, and therefore, living-donor LT (LDLT) is affected by family dynamics for both recipients and donors (Watanabe & Inoue, 2010).

Patients experience an adaptation process after LT (Mize & Cupples, 2004). Numerous studies report that liver transplant recipients (LTR) undergo problems with their physical, psychological, and social well-being after transplantation (Forsberg *et al*., 2000; Bean, 2005; Nilsson *et al*., 2008; Watanabe & Inoue, 2010; Ordin *et al*., 2011). Together with recovery of physical conditions after LT, patients reportedly experience fatigue, pain, and weight loss, as well as impairments in memory and thinking processes (Forsberg *et al*., 2000). LTR, whose liver failure was related to hepatitis B virus and hepatitis C virus infection, experience poorer recovery outcomes than LTR associated with other causes of liver failure (Aytaman *et al*., 2010). Hypertension, diabetes, and obesity associated with immunosuppressant therapy might develop in the long-term, post-LT period (Lui & Thomas, 2007). There is considerable evidence of other problems that LTR experience, including pain, changes in appetite, nausea, vomiting, infection, loss of concentration, increased hair growth, moon face (cushingoid), bruising, loss of sexual desire, and depressive feelings (Moons *et al*., 2003; Estraviz *et al*., 2007; Drent *et al*., 2009; Kugler *et al*., 2009).

Psychologically, although LTR feel lucky that they have survived (Bean, 2005), they also experience fear of organ rejection, depression, anxiety, and impairments related to their future health. Several studies have reported that patients with LDLT experience greater negative affects (Fukunishi *et al*., 2002; McGregor *et al*., 2009; Watanabe & Inoue, 2010).

Socially, patients might return to work after LT, and their familial relations improve (Bean, 2005; Watanabe & Inoue, 2010). However, many patients experience reduced competence in their work, economic problems, and social isolation (Forsberg *et al*., 2000; Bean, 2005). Interaction with other patients and participation in support groups can positively affect patients' adaptation after transplantation (Robertson, 1999; Sargent & Wainwright, 2007). LTR need psychological (Fukunishi *et al*., 2002; McGregor *et al*., 2009) and social support from their families and health professionals (Forsberg *et al*., 2000; Jones, 2005). LTR need information related to rejection, activities of daily living (Forsberg *et al*., 2000), drug therapy, long-term care, and possible physical and psychological problems (Myers & Pellino, 2009) associated with their LT.

Correspondence address: Yaprak S. Ordin, Surgical Nursing Department, School of Nursing, Dokuz Eylül University, 35340 Inciralti, Izmir, Turkey. Email: yaprak.sarigol@deu.edu.tr
Received 24 January 2012; revision received 10 May 2012; accepted 16 May 2012.

© 2012 Wiley Publishing Asia Pty Ltd.
doi: 10.1111/j.1442-2018.2012.00715.x

Research exploring the experiences of LTR predominantly relates to samples of people living in European, North American, and East Asian countries. We were unable to locate any research that investigated experiences of LTR in Turkey, which is located in West Asia. Additionally, no work was identified investigating the post-transplantation adaptation processes of LTR using a nursing model.

Therefore, the purpose of this study was to explore experiences of LTR using the Roy Adaptation Model (RAM) following transplantation and a qualitative approach. We aimed to contribute to the further development of the RAM (Perrett, 2007; Roy, 2009). The results of this research will assist in developing nursing practices based on the adaptation process of LTR.

Conceptual framework

RAM

The study was guided by the RAM (Roy, 2009). The RAM depicts the individual as an adaptive system who interacts with a constantly changing environment, including focal and contextual stimuli. Focal stimuli are the internal and external factors that immediately confront the person, and in this study, it was LT. Contextual stimuli are all other factors present in the situation that contribute to the effect of the focal stimulus, and in this study were sociodemographic characteristics (age, sex etc) and liver disease characteristics of LTR (Roy, 2009) (Fig. 1).

Behavior in the RAM refers to internal and external actions, and reactions of people to stimuli. Behavior is categorized into four modes of adaptations: psychological, self-concept, role function, and interdependence. The physiological mode is the manifestation of interactions as physiological activities of all the cells, tissue, and organs, and was represented in this study by physiological components of adaptation. The self-concept mode has been identified as psychic and spiritual integrity, composite of beliefs and feelings, and deals with interpersonal relationships. The self-concept mode was represented in this study by the emotional component of adaptation. The role function mode focuses on the roles that individuals have in society, and was represented by the functional components of adaptation. The interdependence mode deals with social and relational integrity, as well as the provision and receipt of social support. For the purpose of this study, the interdependence mode was represented by the social components of adaptation. In the RAM, behaviors are considered as either adaptive or non-adaptive/ineffective. Adaptive behaviors promote the integrity of the human system in terms of the goal of adaptation. Therefore, ineffective behaviors are those that neither promote integrity, nor contribute to the goals of adaptation and integration of people on Earth (Roy, 2009).

METHODS

Design

A descriptive qualitative design was used for this study, and data were collected from LTR in either individual or group interviews.

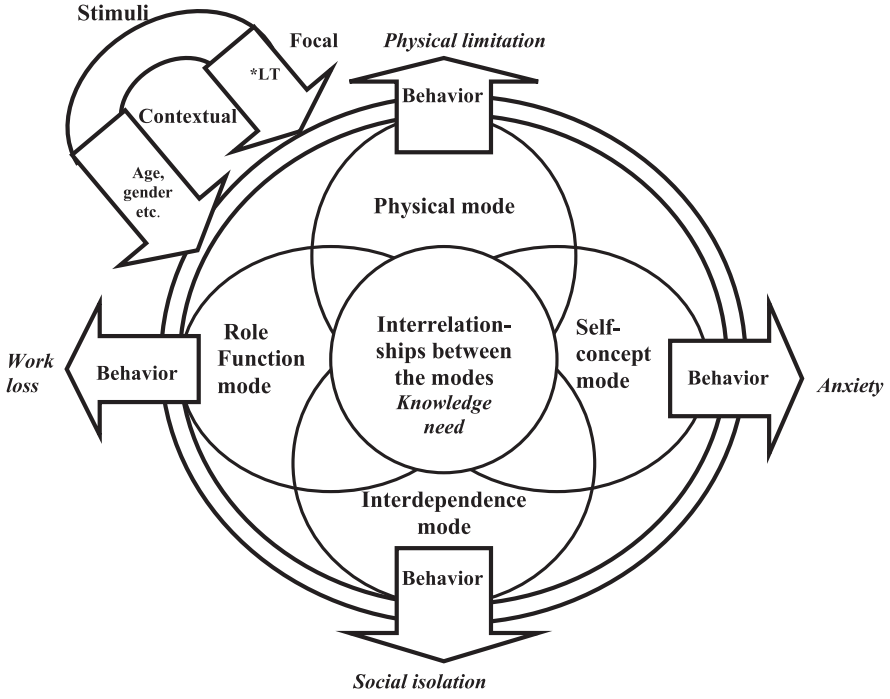


Figure 1. Conceptual framework of the study. LT, liver transplantation.

© 2012 Wiley Publishing Asia Pty Ltd.

Table 1. Demographic and liver disease characteristics of the participants ($n = 21$)

Variables	N %
Age (years)	
Mean ± standard deviation	48.67 ± 11.35
Range	19–64
Sex	
Female	5 (24%)
Male	16 (76%)
Months after liver transplantation	
Range	1–52
Mean	16.00
Disease	
Viral (HBV, HCV)	11 (52%)
HCC	6 (28%)
Cryptogenic	2 (10%)
PBS	1 (5%)
Autoimmune	1 (5%)
Type of donor	
Live	14 (67%)
Deceased	7 (33%)
Relationship to donor	
Mother	1 (7%)
Son	7 (50%)
Cousin	4 (29%)
No relationship	2 (14%)
Occupation pre/post	
Same	2 (10%)
Changing position or job	6 (28%)
Resignation	13 (62%)
Immunosuppressive regimen	
Triple regimen (with tacrolimus)	2 (10%)
Triple regimen (with cyclosporine)	3 (14%)
Double regimen (with tacrolimus)	4 (20%)
Double regimen (with cyclosporine)	6 (28%)
Only tacrolimus	3 (14%)
Only cyclosporine	3 (14%)

HBV, hepatitis B virus; HCC, hepatocellular carcinoma; HCV, hepatitis C virus; PBS, primary biliary cirrhosis.

Participants

In this study, purposive sampling was used (Sandelowski, 2000; Neergaard *et al*., 2009) to recruit participants who met the following inclusion criteria: aged between 18 and 65 years, willingness to participate in the study, no record of psychiatric disease, native Turkish speaker, and experiencing their first transplantation. One of the investigators (YO) provided information to the LTR when they attended the outpatient clinic. A total of 21 patients volunteered to join the study; 16 males and five females, who were aged between 19 and 61 years (mean: 48.67, standard deviation: 11.35). Participants joined the study between 1 and 52 months' post-LT, with a mean time of 16 months (Table 1). Demographic data of the participants were regarded as contextual stimuli.

Data collection

Data were collected from May 2009 to February 2010 at a transplant outpatient department at the university hospital in Izmir, a big city in Western Turkey. Initially, focus groups were planned for data collection, but only one focus group interview was undertaken with seven participants. Due to the practical difficulties participants faced in attending group work, individual semistructured interviews were conducted with the remaining 14 participants.

Interviews were conducted with participants in a private room at the outpatient department. The focus group interview lasted 1 h and 15 min, and individual interviews were 20–60 min in duration. The first and second researchers collected data in the focus group interview, and the first researcher conducted all individual interviews. The interviews were audio-taped and transcribed verbatim by the first author.

Instruments

Two forms were used to determine adaptation behaviors of LTR and stimuli affecting the behaviors of LTR in this study.

A background data form, developed by the investigators for this study, was used to record demographic and liver disease information. The form included questions about demographic data (age, sex, marital status, education level, and occupation) and clinical data (liver disease etiology, donor type, living donor relation, LT time, and immunosuppressive therapy).

An adaptation of the LT interview form was used to determine the LTR adaptation responses to LT. The form was developed by the investigators based on the literature (DeSanto-Madeya, 2006, 2009). The form included seven open-ended questions; four open-ended questions were about how LTR felt physically and emotionally, effects of social roles, and social relations after LT. Three open-ended questions were about the support needs and knowledge needs of the LTR, and the people who supported them during and after LT.

Ethical considerations

Written consent was obtained from all participants prior to data collection. Approval was given by the administration of the hospital where the study was conducted, as well as from the Ethics Committees of Dokuz Eylul University and School of Nursing (Izmir, Turkey).

Data analysis

Data were coded using deductive content analysis, as recommended by Elo and Kyngas (2008), where the structure of analysis is operationalized on the basis of previous knowledge and theory testing. Deductive content analysis was used to identify and categorize the LTR responses. The responses were categorized according to the four RAM modes of adaptation (physiological, self-concept, role function, interdependence). The deductive content analysis process required development of structured analysis matrices, using words, phrases, or sentences that express a response within each question unit, coding data according the categories (adaptive and ineffective behaviors based on the adaptation modes of

© 2012 Wiley Publishing Asia Pty Ltd.

the RAM), model testing, and comparisons to determine correspondence with the study questions, as well as reporting the analysis process and the results (Sandelowski, 2000; Elo & Kyngas, 2008).

Rigor

Two people analyzed the data independently. The first author and another person with expertise in qualitative research independently identified the main themes, and then compared their analyses and reached an agreement on the findings. Credibility was established by two authors who have considerable clinical experience with people requiring LT. The first author had 5 years' experience, and the second author had 10 years' experience. All authors had been trained in qualitative methods. The third author had expertise in qualitative methodology and provided a critical review of the methodology.

Findings

Experiences of physical, emotional, functional, and social adaptation to LT were categorized according to four themes based on the four modes of the RAM. Each theme included both adaptive and ineffective behaviors of participants identified at different times during their recovery process after LT.

Physiological mode

Roy (2009) described the physiological mode as focusing on the maintenance of basic human physiological needs. Physiological adaptation requires knowledge about the human body and the pathophysiology underlying the disease processes, and the adoption of behaviors directed toward resolution of physical and physiological problems (Roy, 2009).

In this study, LTR noted that they experienced problems concerning the physiological mode more frequently in the early period of LT (first 3 months). Most of the LTR experienced ineffective behaviors with digestive system changes, including excessive appetite, nausea, and vomiting. Several LTR reported oliguria, diarrhea, constipation, and abdominal distention. Most of the patients also complained of mouth sores in the first 3 months. They thought that these problems were due to the medications they received, but admitted that they did not know the side-effects of the medications well. Most of the LTR also noted that they did not know much about the diet they had to follow, the medications they received, and other things they had to be careful with after transplantation:

> I know some drugs make me feel sick, but I am not sure that the drugs I used cause the problems.

The LTR whose living donors were their family members reported that they followed all the recommendations made by the transplantation team and experienced fewer problems, as they felt responsible to their donors:

> I take care of myself and my medications well because of the sacrifice my mother made for me. (An LTR whose living donor was his mother)

Some patients explained that they took preventative actions against infections (i.e. using a face mask), especially during the early period after LT, and therefore, they did not have any infections. Most of the LTR reported that they had upper respiratory system infections in the winter months, and that they did not know why they were at risk of infection and what precautions they needed to take to prevent these infections. Two LTR said that they experienced organ rejection, although they took their medications regularly:

> What is important for me is not to catch an infection. How can I protect myself from infection best?

LTR mostly experienced pain at the incision area, wound drainage area, and in their back and joints after LT in the early stage. They reported that they made less physical effort to decrease their pain. LTR also reported that pain reduced as the post-LT period passed because edema and ascites disappeared. Several patients, however, said that they considered post-transplantation pain as normal:

> I had an important operation and my liver was changed. It is not unusual to have that much pain. I can ignore it.

All patients experienced fatigue in the early term after transplantation, due to daily activities and frequent medical appointments. In the long-term, after transplantation, they experienced some level of fatigue due to travel to the liver transplant center from the city which they lived. LTR described physical limitations and sleeplessness because of their pain and anxiety:

> I feel much better compared to my cirrhosis period. My energy is unbelievable. I am surprised at myself, too.

> I am getting tired easily. For example, I am going to the kitchen and do something, but then I tire.

Several LTR noted that they had hypertension after transplantation, but that they did not know the cause of their hypertension and the things they had to be careful with. In addition, many patients reported that they became forgetful, which had a negative effect on their life. They also noted that they had difficulty in concentrating on and understanding things:

> The most disturbing is forgetfulness for me. I simply don't remember whether I have taken my medications or not. I don't remember anything.

One patient was diagnosed with diabetes mellitus after LT. This patient said that he did not know why he developed diabetes or what he should be careful about.

Self-concept mode

The self-concept mode refers to how a person views himself or herself. This mode emphasizes the psychological and spiritual aspects of the person. The self-concept mode is viewed as having two subareas: the physical self and the personal self.

© 2012 Wiley Publishing Asia Pty Ltd.

The physical self includes two components: body image and body sensation. Body image refers to how a person feels about their physical appearance and bodily functions; body sensation refers to the composite of beliefs and feelings held about oneself (Roy, 2009).

A number of LTR expressed feeling powerless and said that they experienced negative changes, including excessive weight gain, increased hair growth, edema, and the development of spots. They said that they were anxious, as they did not know the causes of these problems. However, several LTR noted that jaundice, skin eruptions, bruises, and abdominal ascites decreased compared to the pretransplantation period. They were satisfied with their physical appearance and felt better:

> My complexion got fair after transplantation. It (is) revived, and it is very nice now.

While many LTR expressed a considerable improvement in their sexual life in the long term, some LTR experienced deterioration in their sexual life:

> I have no sexual life after transplantation. My wife tolerates it, but I feel bad.

Most of the LTR felt as if they were reborn, and wanted to care for their health more in response to the sacrifice made by the donors. Participants expressed that positive thinking would affect their health positively, and hoped that they would continue to improve as post-LT time passed. Many participants reported an increased interest in religious practices after LT:

> I am very well psychologically. I feel . . . reborn.

> I bought a Koran and I am reading it. I became interested in it after the operation.

Some LTR experienced fear of infection and rejection, as well as anxiety due to their drain tubes and medical appointments. They explained that they had fear of rejection, although they were careful with their medications and follow-up appointments. They added that they wanted to know the signs of rejection, and thus check whether they had it or not:

> I am panicking about everything, and I feel very close to death. I feel that something bad may happen any minute and that I develop rejection. Nobody can make sure that rejection will not develop.

LTR were also worried about families of deceased donors and the health of living donors (especially when the donors were children) and felt guilty. While some recipients, whose living donors were family members, struggled with the sacrifice made for them, others felt regretful due the harm likely to be experienced by their donor. Additionally, LTR emphasized their experiences of anxiety due to their unemployment, the financial effects after LT, the expense of LT treatment, and the distance needed to travel to LT centers:

> When I think about the deceased donor's family, I say I wish it had never happened. I always think about her family. (LTR on deceased donor)

> My son gave his liver to me, which affected me psychologically. Now I regret it and I feel as if I die every. (LTR with living donor)

Role function mode

The role function mode encompasses development, performance, and mastery of a person's roles. These include primary roles (age, sex), secondary roles (husband, teacher), and tertiary roles (association member) on the basis of his or her position within society (Roy, 2009).

Only two LTR were able to continue their previous (before LT) employment in their secondary roles, and they reported improved work performance. These patients explained that they felt better and that their financial problems decreased after they returned to their work:

> I am working in a government office. I haven't had any bad experiences at the office.

Most participants reported that they were no longer being employed after LT. The reasons offered included an inability to work due to fatigue, frequent medical appointments, and the risk of infection at the workplace. Some participants took disability retirement. These patients expressed their need to be informed about their employment status and what kind of jobs they could be hired for after transplantation:

> I had a job in the past. They fired me after the operation. I am not (a) half person and I am healthy, but I cannot find a job now due to liver transplantation, so I have big financial problems.

Interdependence mode

The interdependence mode focuses on the close relationships of people, especially two specific relationships. The first relationship is with significant persons who are the most important to a given person. The second relationship is with support systems; that is, others contributing to meeting interdependence needs (Roy, 2009).

LTR reported improved intra-familial relations and also developed communication with other LTR. A special affection between living donors and the families of the deceased donors was created in most cases. However, all the LTR whose employment status was affected after transplantation reported that dynamics in their families were distorted due to financial problems:

> I met someone who had undergone an LT when I was staying in hospital, and it affected me positively. I like talking to the people who have experienced the same difficulties as me.

LTR also noted that they experienced social isolation, as they wore a mask to avoid risk of infection. All the patients whose residence was some distance from the transplantation center reported that they felt lonely. These patients rented a flat near the center so that they would be able to attend frequent follow-up appointments in the first 6 months of transplantation:

© 2012 Wiley Publishing Asia Pty Ltd.

> After discharge, my family and I rented a flat near here, since I had to have frequent follow-up appointments. We don't know anyone here and we feel lonely.

The patients reported that they were supported by their families and health professionals (doctors and nurses), relatives, friends, and other LT patients in the LT process. They noted that they needed more support from their doctors and nurses in the early period of transplantation:

> My family provided me with strong support after transplantation. God bless my doctors and nurses for their support.

LTR identified a need for physical care, because they had difficulty in personal care activities due to pain and fatigue, particularly during the early post-transplantation period. All the patients reported that they needed a lot of psychological support after transplantation:

> I think a psychologist should be available for the transplantation patients because we are different from other patients.

Additional support was identified as needed in the area of financial advice related to the length of sick leave after LT and its effects on salaries, the treatment expenses, transportation expenses, and working conditions of the living donors:

> Since I couldn't work and had to have a work leave in the first 6 months of transplantation, I was paid less, which I hadn't known about. We need to be informed about this issue.

DISCUSSION

The results of the study will be discussed in the light of the adaptation modes of the RAM.

Physiological mode

In this study, increased appetite, diarrhea or constipation, nausea, and vomiting were expected symptoms due to immunosuppressive treatment (Moons *et al*., 2003; Estraviz *et al*., 2007; Bufton *et al*., 2008). Education and counseling play an important role in the management of these symptoms, and in enabling patients to gain their autonomy and to adapt to their new life (Sargent & Wainwright, 2007).

Consistent with the results of this study, it has been reported in the literature that LTR mostly experience tiredness, decreased physical activity, and sleeplessness (Forsberg *et al*., 2000; Bean, 2005; Dudley *et al*., 2007; Kugler *et al*., 2009). In the present study, it was revealed that the patients expected nurses to fulfill their self-care needs due to their tiredness and physical limitations. Failure to satisfy needs of physical care, knowledge, and support can be explained by the insufficient number of nurses (approximately 15–20 patients per 1 nurse) and lack of specialist transplant nurses in Turkey. Specialist organ transplant nurses provide special care, knowledge, and support needs of transplant recipients and their families during the transplantation process. It is recommended that a certified program for specialist transplant nurses be developed, and that the roles and responsibilities of specialist transplant nurses in Turkey be defined.

Repeated infections, rejections, and hepatitis are life-threatening in LTR (Forsberg *et al*., 2000; Sargent & Wainwright, 2007; Nilsson *et al*., 2008). The protection dimension of the physiological mode is an important mode where LTR-specific problems are found. Transplantation nurses should evaluate patients' behavior in this mode carefully, and offer education and counseling directed toward the promotion of appropriate adaptation behavior among the patients (Myers & Pellino, 2009).

Pain is an important problem that affects physical activities, as well as the psychological and employment status of patients. Although pain management is a basic nursing practice, the patients in this study reported that they experienced pain frequently. There is a wide variety of factors affecting pain in transplantation patients, and it has previously been reported that LTR experience pain more frequently than other transplant patients (Fukunishi *et al*., 2002). Frequent experiences of pain among the participants of this study can be explained by the anxiety they felt from the thought they might have harmed their living donors, most of whom were their first-degree relatives, such as their sons and mothers.

Compatible with the literature, we found that few patients had edema, abdominal ascites, and bruises (Drent *et al*., 2009; Kugler *et al*., 2009). In this study, the patients reported that they had increased blood pressures in the long term after LT. Increased blood pressure is a common cardiovascular problem due to long-term immunosuppressive treatment (Lui & Thomas, 2007). Additionally, in the neurological dimension, the patients experienced forgetfulness, decreased concentration, and difficulty in understanding things (Moons *et al*., 2003). These patients needed appropriate knowledge and support so that they could adapt to their life.

Self-concept mode

It is important for nurses to have knowledge about a persons' self-concept, because they play a key role in the enhancement of a LTR's self-concept (Roy, 2009). Nurses need to understand and be comfortable with a personal physical self related to body image, body sensation, and sexuality to support patients in this mode (Roy, 2009).

Consistent with the results of this study, previous reports document patients becoming hirsute and experiencing changes in their body image, especially in their face, with thinning of the skin and loss of facial hair (Drent *et al*., 2009). These problems are mostly due to immunosuppressive treatment (Bufton *et al*., 2008). Therefore, it is important that nurses inform patients about the use of medications and the management of the side-effects of those medications (Myers & Pellino, 2009).

In the present study, all the patients noted experiencing financial problems, which can be attributed to Turkey being a developing country where income per person is low. As transplantation centers are located in big cities in Turkey, the patients coming from other cities have to pay for accommodation and travel. The patients are offered financial support for travel and provided a salary given to the handicapped, but

© 2012 Wiley Publishing Asia Pty Ltd.

they were insufficient. Getting fired from a job after LT has a negative effect on the financial status of patients. Due to lack of a financial advisor in LT centers in Turkey, LTR are not informed about the financial problems they are likely to experience. We recommend that specialist transplant nurses provide counseling to LTR about financial problems in the absence of a financial advisor.

The participants of this study felt anxious and disappointed, although they found themselves lucky that they survived. As there was a dramatic and fast change in the patients' lives, the self-concept mode was greatly affected. The first factor affecting the psychology of the patients is fear of organ rejection or complications and worries about the future (Jones, 2005; Sargent & Wainwright, 2007; Nilsson *et al*., 2008). Therefore, the patients should be informed about the problems they are likely to encounter and about long-term care (Myers & Pellino, 2009). The second factor is feeling guilty or indebted to their living donors or the families of non-living donors (Fukunishi *et al*., 2002; Watanabe & Inoue, 2010). The patients had strong feelings of guilt when they received their liver from a living donor. This factor is of great importance in Turkey, as the rate of living donors is quite high. In countries, such as Turkey, where the number of living donors is high, patients, donors, and their families should be informed about the phenomenon of living donors and the transplantation process (Watanabe & Inoue, 2010) and be provided with psychological support (Forsberg *et al*., 2000; Jones, 2005). The third factor is using many medications in the early post-transplantation period, using lifelong medications, and living with the side-effects of medications.

Role function mode

Concerning the role function mode, most of the patients in this study had to leave their job, find another job or retire earlier than expected. Likewise, as in previous research, it was often difficult for recipients to continue to work (Bean, 2005; Sargent & Wainwright, 2007; Watanabe & Inoue, 2010). Due to physical and psychological problems and the risk of infection, the employment status of LTR is negatively affected. Another problem is that LTR require leave from work because LT centers are far away from where they live, and they require frequent follow-up care at these centers. Financial losses due to work leave have a negative effect on family budgets and the roles LTR play in their families. Nurses should offer information to patients and their families about employment status and possible problems after LT.

Interdependence mode

Comparable with the previous research, this study showed that the relationships of LTR with members of their families were affected, and that LTR experienced social isolation (Forsberg *et al*., 2000; Bean, 2005; Sargent & Wainwright, 2007). As the number of patients whose living donors were their family members was high, the degree that the patients' relationships with their family members are affected is important in this study. The relationships with members of their families were most affected during the early post-transplantation period. Therefore, longitudinal studies including the patients, the donors and their families are needed to examine to what extent they are affected. In Turkish culture, it is of importance to visit patients and their families. After discharge, patients' homes are usually crowded. However, LTR do not allow visits due to risk of infection, which has a negative influence on the social relationships of the patients.

Communication between LTR can have a positive influence on their adaptation (Sargent & Wainwright, 2007). Thus, support groups can be offered to LTR and their families to provide an avenue for social integration.

Study limitations

The study has two major limitations. First, the study was retrospective and cross-sectional. Therefore, further longitudinal studies are needed to expand the understanding of the long-term adaptation process of the LTR. Second, we only considered recipients' perspectives. The rate of LT from living donors is quite high in Turkey. For this reason, further studies including recipients, their living donors, and families are needed.

Conclusions

The results of this study provide nurses with fundamental data about adaptation behaviors of LTR. According to the RAM, the nursing process involves an evaluation of stimuli and behaviors that have a negative effect on adaptation of individuals, planning nursing activities accordingly, and evaluation of the effectiveness of these activities. It was found that patients needed information and support regarding their ineffective behaviors in all modes of the RAM. It is recommended that the information and support needs of patients be met and provided within their social environment by health professionals using a well-structured approach. This research also clearly demonstrated the interactions among the adaptation modes of the RAM.

ACKNOWLEDGMENTS

We wish to thank the patients who readily agreed to participate in this study. We also wish to thank Emine Catal for assisting in the data analysis, Professor Dr. Gülseren Kocaman and Associate Professor Dr. Aklime Dicle for their contributions in the thesis committee, and Professor Dr. Sedat Karademir, the surgeons at the liver transplantation center, and the president of the transplantation institute for their support and contributions.

CONTRIBUTIONS

Study Design: YO, ÖK.
Data Collection and Analysis: YO, ÖK.
Manuscript Writing: YO, ÖK, SW.

REFERENCES

Aytaman A, Kaufman M, Terrault NA. Management of posttransplant hepatitis C infection. *Curr. Opin. Organ. Transplant.* 2010; **15**: 301–309.

© 2012 Wiley Publishing Asia Pty Ltd.

Bean KB. An exploratory investigation of quality of life in adult liver transplant recipients. *Prog. Transplant.* 2005; **15**: 392–396.

Bufton S, Emmett K, Byerly AM. Liver transplantation. In: Ohler L, Cupples S (eds). *Core Curriculum for Transplant Nurses*. St Louis: Mosby, 2008; 423–455.

DeSanto-Madeya S. Secondary analysis of the meaning of living with spinal cord injury using Roy's adaptation model. *Nurs. Sci. Q.* 2006; **19**: 240–246.

DeSanto-Madeya S. Adaptation to spinal cord injury for families post-injury. *Nurs. Sci. Q.* 2009; **22**: 57–66.

Drent G, Geest SD, Dobbels F, Kleibeuker JH, Haagsma EB. Symptom experience, nonadherence and quality of life in adult liver transplant recipients. *J. Med.* 2009; **67**: 161–168.

Dudley T, Chaplin D, Clifford C, Mutimer JD. Quality of life after liver transplantation for hepatitis C infection. *Qual. Life Res.* 2007; **16**: 1299–1308.

Elo S, Kyngas H. The qualitative content analysis process. *J. Adv. Nurs.* 2008; **62**: 107–115.

Estraviz B, Quintana JM, Valdivieso A, Bilbaod L. Factors influencing change in health-related quality of life after liver transplantation. *Clin. Transplantat.* 2007; **21**: 481–490.

Forsberg A, Backman L, Möller A. Experiencing liver transplantation: a phenomenolocigal aproach. *J. Adv. Nurs.* 2000; **32**: 327–334.

Fukunishi I, Sugawara Y, Takayama T, Makuuchi M, Kawarasaki H, Surman OS. Association between pre-transplant psychological assessment and post transplant psychiatric disorders in living-related transplantation. *Psychosomatics* 2002; **43**: 49–54.

Jones JB. Liver transplant recipients' first year of posttransplant recovery: a longitudinal study. *Prog. Transplantat.* 2005; **15**: 345–352.

Kugler C, Geyer S, Gottlieb J, Simon A, Havenrich A, Dracup K. Symptom experience after solid transplantation. *J. Psychosom. Res.* 2009; **66**: 101–110.

Lui LU, Thomas SD. Long-term care of the liver transplant recipient. *Clin. Liver Dis.* 2007; **11**: 397–416.

McGregor LM, Swanson V, Hayes PC, Forsythe JR, O'Carroll RE. Considering adult living donor liver transplantation: a qualitative study of patients and their potential donors. *Psychol. Health* 2010; **25**: 751–66.

Mize JB, Cupples S. Coping with transplantation. Part 2: posttansplant phase. *Prog. Transplant.* 2004; **14**: 71–72.

Moons P, Morgodt D, Geest SD *et al*. Health-related quality of life and symptom experience in tacrolimus-based regimens after renal transplantation: a multicentre study. *Transplantation* 2003; **16**: 653–664.

Myers J, Pellino TA. Developing new ways to address learning needs of adult abdominal organ transplant recipients. *Prog. Transplantat.* 2009; **19**: 160–166.

Neergaard MT, Olesen F, Andersen RK, Sondergaard J. Qualitative description – the poor cousin of health research? *BMC Med. Res. Methodol.* 2009; **9**: 1–5.

Nilsson M, Persson LO, Forsberg A. Perceptions of experiences of graft rejection among organ transplant recipients striving to control the uncontrollable. *J. Clin. Nurs.* 2008; **17**: 2408–2417.

OPTN/SRTR. "The U.S. Organ Procurement and Transplantation Network and The Scientific Registry of Transplant Recipients" 2010 Annual Report. [Cited 10 Jan 2012.] Available from URL: http://www.srtrt.org/annual_report/2010.

Ordin SY, Dicle A, Wellard S. Quality of life in recipients before and after liver transplantation in Turkey. *Prog. Transplantat.* 2011; **23**: 206–267.

Perrett SE. Review of Roy adaptation model-based qualitative research. *Nurs. Sci. Q.* 2007; **20**: 349–356.

Robertson G. Individuals' perception of their quaility of life following a liver transplant: an exploratory study. *J. Adv. Nurs.* 1999; **30**: 497–505.

Roy C. *The Roy Adaptation Model* (3rd edn). Upper Saddle River, NJ: Pearson Prentice Hall Health, 2009.

Sandelowski M. Whatever happened to qualitative description? *Res. Nurs. Health* 2000; **23**: 334–340.

Sargent S, Wainwright SP. A qualitative study exploring patients perceived quality of life following an emergency liver transplant for acute liver failure. *Intensive Crit. Care Nurs.* 2007; **23**: 272–280.

The Ministry Health of Turkey. *Health Statistics Yearbook, Republic of Turkey Ministry of Health*. 2008. [Cited 22 Jan 2012.] Available from URL: http://www.saglik.gov.tr/TR/dosya/1-71504/h/saglik-istatistikleri-2008.pdf.

Turkish Transplantation Society – TNS, Türkiye Organ Nakli Derneği-TOND. *The Development of Transplantation in Turkey*. 2012. [Cited 22 Jan 2012.] Available from URL: http://www.tond.org.tr.

Watanabe A, Inoue T. Transformational experiences in adult-to-adult living-donor liver transplant recipients. *J. Adv. Nurs.* 2010; **66**: 69–81.

© 2012 Wiley Publishing Asia Pty Ltd.