



The role of healthcare professionals to improve organ donation and transplantation outcome: a national study

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Abstract

Background Improve the quality of donor coordination activities caused by an increased organ donation rate. The aim of this study was to assess the influence of organ donation coordinators' characteristics on rate of donation and family consent rate in Recognition Centers (RCs) and Organ Procurement Units (OPUs)

in Iran by analyzing the organ procurement and transplantation data.

Materials and methods Based on a questionnaire, this retrospective study evaluated the number of confirmed brain deaths, family consent rate, organ recoveries, rate of expired brain death cases before and after family consent in Iran.

Results According to results, the overall family consent rate in the entire country is equal to 60.63%. The work experience had a significant effect on the number of procured organs ($P < 0.004$), death rate after family consent ($P < 0.04$), and eligible donor death before family consent ($P < 0.03$). The type of unit (RCs or OPUs) had significant difference on death after family consent ($P < 0.023$), the death before family consent ($P < 0.014$), the sum of procured organ ($P < 0.04$).

Conclusion The consent rate and donor management in the cases of brain death are unacceptable. The coordinators need training to increase their efficiency in terms of family approach and maintenance of brain death. Only by improving the level of family consent and increasing the coordinators' maintenance skills for brain death cases can the amount of organ donation in Iran be doubled to the current amount.

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Keywords Organ donation coordinator · Deceased organ donor · Consent Rate · Donor management

Background

The outstanding progress in all types of transplantation during recent years has dramatically increased graft and patient survival (Black et al. 2018). But one of the major limiting factors for further developing organ donation and transplant programs is a worldwide organ shortage (TTS, 2011). Nonetheless, organ donation shortage is a global issue, persisting in all countries (Lewis et al. 2021). Globally, there is a large gap between the numbers of potential recipients on waiting lists and the available organs for transplant (Wynn and Alexander 2011). This is a serious international problem because the number of patients requiring organ transplants is continually increasing on the waiting list while the insufficient number of donors is unable to respond to the demand (Chan et al. 2011; Girlanda 2016; Organization 2010).

Iran has 82 million inhabitants distributed within 1 648 195 km², divided into 31 provinces (Danaei et al. 2019). Iran is the most successful country in the Middle East Society for Organ Transplantation (MESOT) (Mekkodathil et al. 2019). All organ donation and transplantation activities are performed by Organ Procurement Units (OPUs) and Recognition Centers (RCs). The statistics found within the Ministry of Health's organ procurement and transplantation database confirm that in Iran, in 2019, 24,078 transplants were performed from a total of 8367 deceased donors, while during that same time there were 12,000 patients on the transplant waiting list. Unfortunately, there are an average of fewer than 1000 annual donations [1074 cases in 2019, 923 cases in 2018]; 7–10 or more patients die every day waiting for a transplant (Pourhosein et al. 2022).

What are OPU and RC?

The OPU and RCs cover all regions of Iran due to Iran's geographical vastness. All organ and tissue procurement and transplantation activities are under the direct supervision of the Ministry of Health in Iran and OPUs are responsible for brain deaths detection and donor management, as well as the consultations and procurement. RCs are a subset of OPUs that are responsible for brain death detection, brain death assessment, donor management, and consultations with the family to obtain consent. After family

consent has been obtained, RCs transfer the brain case to OPUs for organ procurement. It should be noted that all OPUs and RCs have hospitals equipped with ICUs for potential donor management, and organ procurements are performed only in OPUs (Mahdi et al. 2022).

Factors such as ethics, values, and personal beliefs play an important role in the whole process of organ donation (Cameron and Forsythe 2001; Ghaffari et al. 2019). Besides these factors, according to Manyalich, a trained donor coordinator within every hospital is a vital factor to maximize deceased donor potential and eventually increase donation rates (Manyalich et al. 2013). Similarly, Atsal et al. showed that establishing the coordinator units has solved coordination problems and increased the rates of deceased donors (Atsal and Coken 2017). All in all, improving the quality of coordinator activities has resulted in an increased organ donation rate (Tokalak et al. 2005).

The aim of this study was to assess the influence of organ donation coordinators' characteristics (work experience and field of study) on rate of donation and family consent rate in RCs and OPUs in Iran before the COVID-19 pandemic by analyzing the organ procurement and transplantation data.

Materials and methods

This retrospective questionnaire-based study was performed in 2021 in Iran. The survey evaluated the number of confirmed brain deaths, number of family consents for donation, number of organ recoveries, Rate of expired brain death cases before and after family consent, the rate of family consent (this rate was obtained from the number of family consent over the total family encounter) and the number of procured organs per donor.

Questionnaires were sent by an official letter from the transplant office in the Ministry of Health in Iran to the chief executives of OPUs and RCs. From all OPUs and RCs in Iran, 31 centers (12 OPUs and 19 RCs) with 131 coordinators participated in this study. After the check of all questionnaires, incomplete questionnaires were omitted due to incomplete data. We were able to analyze the remaining 103 questionnaires.

The summary of results for the continuous variables is presented as numbers and percentages for

variables, as well as the median (\pm IQR) changes in continuous outcome variables. Univariate statistical analysis using Chi-square test and one-way ANOVA was used to compare data. All data were analyzed using SPSS₁₆ software. A *P* value less than 0.05 was considered statistically significant.

Results

According to data from the transplantation office of the Ministry of Health, the organ donation rate in Iran

varies greatly between the different sections of Iran in terms of access to organ donation (from 0 donors per million inhabitants in Sistan, Balouchestan, and Ilam provinces to 42.7 in Yazd province in 2019). In total, 114 national organ donation and transplantation units were defined in Iran. These include 24 Organ Procurement Units (OPU) and 31 Recognition Centers (RC) and also 59 transplantation units (see Table 1).

According to Table 2, the mean work experiences in OPUs and RCs were 6.18 ± 3.76 and 3.92 ± 3.54 , respectively. There was a significant difference between the mean work experience in RCs and OPUs.

Table 1 Deceased donors in different provinces of Iran by PMP and the number of transplant wards

| Province | PMP by year | | | Transplant ward | | | | | |
|-----------------------|-------------|-------|-------|-----------------|-------|-------|------|----------|-----------|
| | 2017 | 2018 | 2019 | Kidney | Liver | Heart | Lung | Pancreas | Intestine |
| Yazd | 27.43 | 35.40 | 42.7 | * | * | * | | | |
| Semnan | 17.14 | 24.29 | 38.02 | | | | | | |
| Fars | 19.38 | 20.62 | 34.57 | * | * | * | * | * | * |
| Chaharmahal Bakhtiari | 35.11 | 22.47 | 33.7 | * | | | | | |
| Zanjan | 19.05 | 14.29 | 30.6 | * | | | | | |
| Tehran | 21.49 | 21.35 | 27 | * | * | * | * | * | |
| Kohkloye & Boyerahmad | 26.76 | 30.99 | 26.5 | | | | | | |
| Alborz | 16.61 | 14.02 | 21.8 | | | | | | |
| Razavi.Khorasan | 15.4 | 9 | 17.4 | * | * | * | * | * | |
| Ardebil | 13.39 | 17.32 | 16.4 | * | | | | | |
| Bushehr | 15.52 | 7.09 | 14.5 | | | | | | |
| Hormazgan | 0 | 5.08 | 14.5 | | | | | | |
| Qazvin | 4.72 | 7.09 | 10.1 | | | | | | |
| Qom | 13.95 | 2.33 | 10.1 | | | | | | |
| Gilan | 9.49 | 9.09 | 9.7 | * | * | | | | |
| Esfahan | 10.74 | 10.16 | 8.86 | * | * | * | | | |
| North. Khorasan | 5.81 | 7.79 | 8.7 | | | | | | |
| South. Khorasan | 6.49 | 7.79 | 8.2 | | | | | | |
| Hamedan | 8.09 | 6.36 | 7.5 | * | | | | | |
| Mazandaran | 9.45 | 6.71 | 7.35 | * | | | | | |
| Lorestan | 1.7 | 2.84 | 6.7 | | | | | | |
| Kermanshah | 5.13 | 3.59 | 6.5 | * | | | | | |
| East. Azarbayejan | 2.82 | 3.85 | 6.2 | * | * | * | | | |
| Markazi | 7.69 | 6.29 | 5.55 | | | | | | |
| Kerman | 7.59 | 6.01 | 5.47 | * | * | | | | |
| West. Azarbayejan | 3.37 | 3.99 | 4.7 | * | | | | | |
| Kordestan | 0.63 | 3.13 | 3.2 | | | | | | |
| Goulesthan | 3.23 | 2.15 | 2.9 | | | | | | |
| Khozestan | 3.18 | 4.88 | 2.43 | * | * | * | | | |
| Ilam | 3.45 | 0 | 0 | | | | | | |
| Sistan & Baluchestan | 0.36 | 1.08 | 0 | * | | | | | |

Table 2 Demographic characteristics of donor coordinators in RCs and OPUs

| Variable | | RC | OPU | Total | <i>P</i> value |
|-----------------------------|----------------------|-------------|-------------|-------------|----------------|
| Work experience (mean ± SD) | | 3.92 ± 3.54 | 6.18 ± 3.76 | 4.75 ± 3.77 | 0.003 |
| Field of study | Nurse | 53 (80.3%) | 30 (78.9%) | 83 (80.6%) | 0.206 |
| | General practitioner | 10 (15.2%) | 4 (10.5%) | 14 (13.6%) | |
| | Social worker | 0 (0%) | 2 (5.3%) | 2 (1.9%) | |
| | Others | 2 (5.3%) | 2 (3%) | 4 (3.9%) | |

Based on the results, 83 (80.6%) of the coordinators in OPUs and RCs are nurses, followed by 14 (13.6%) general practitioners. A significant difference between the coordinator's field of study in OPUs and RCs was not demonstrated (see Table 2).

There is a significant difference between OPUs and RCs in terms of death of eligible donors before and after family consent, and more than 60% in total had one or more cases expire before the consent process was concluded. According to results, the overall family consent rate in the entire country is equal to 60.63% (see Table 3).

The results of a one-way ANOVA showed that work experience had a significant effect on the number of procured organs ($F=2.57$, $P<0.004$), death rate after family consent ($F=1.87$, $P<0.04$), and eligible death before family consent ($F=1.67$, $P<0.03$). In addition, according to a one-way ANOVA, field of study has a significant difference in the number of procured organ ($F=6.5$, $P<0.001$) and family

consent rate ($F=5.35$, $P<0.025$). Finally, the type of unit (RCs or OPUs) had significant difference on death after family consent ($F=5.35$, $P<0.023$), the death before family consent ($F=6.30$, $P<0.014$), the sum of procured organ ($P<0.042$).

Discussion

The rate of organ donations and pooling organs for transplantation from one country to another is very different (Waki 2006). The rate of organ donation in Iran from 2003 to 2019 has increased by 19.06% (Mahdi et al. 2022). Iran has a large amount of eligible organ donors annually due to a high rate of head trauma caused by car accidents (Dehghani et al. 2011). According to several studies, the rates and results of donation and transplantation depend on cultural, social, religious, legal, and organizational

Table 3 The number of eligible donor deaths before and after family consent

| Variable | Number | RCs | | OPUs | | Total | | <i>P</i> value |
|---|--------|--|------|------|------|-------|------|----------------|
| | | F | % | F | % | F | % | |
| | | Eligible donor death before family consent | 0 | 24 | 36.4 | 17 | 44.7 | |
| 1 | 6 | 9.1 | 3 | 7.9 | 9 | 8.7 | | |
| 2 | 4 | 6.1 | 9 | 23.7 | 13 | 12.5 | | |
| 3 | 7 | 10.6 | 3 | 7.9 | 10 | 9.6 | | |
| 4 | 3 | 4.5 | 1 | 2.6 | 4 | 3.8 | | |
| 5 | 4 | 6.1 | 2 | 5.3 | 6 | 5.8 | | |
| 6 and more | 18 | 27.1 | 3 | 7.9 | 21 | 20.2 | | |
| Eligible donor death after family consent | 0 | 23 | 60.5 | 44 | 66.7 | 67 | 64.4 | 0.023 |
| 1 | 10 | 26.3 | 3 | 4.5 | 13 | 12.5 | | |
| 2 | 1 | 2.6 | 4 | 6.1 | 5 | 4.8 | | |
| 3 | 1 | 2.6 | 1 | 1.5 | 2 | 1.9 | | |
| 4 | 0 | 0 | 1 | 1.5 | 1 | 1 | | |
| 5 | 3 | 7.9 | 1 | 4.5 | 4 | 3.8 | | |
| 6 and more | 0 | 0 | 12 | 15.2 | 12 | 14.4 | | |

factors (Bando et al. 2008; Latifi et al. 2021; Manyalich et al. 2005; Nathan et al. 2003).

The experience of the coordinator in approaching families for consent to donation may affect organ donation rates (Ahmad et al. 2019). According to the results of this study, the rate of family consent in Iran is 60.63%. It is worth noting that Spain has a high family consent rate of 85% (Fabre 2014). The total number of deceased donors in the USA has also increased over the years (Nathan et al. 2003). Although the need for organ donation has increased over the past 2 decades, the consent to organ donation in Iran has still remained constant (Shafran et al. 2014). European countries such as Spain, Belgium, and Austria try to use the opt-out system for organ donation (Borry et al. 2008). Under an opt-out system, the absence of explicit refusal automatically makes the patient a potential donor. Iran might need to consider establishing an opt-out system as a way to increase donation rates. Besides opt-out, other changes such as a national/regional/hospital coordination network, establishing a transplant coordinator and approaching family members (Matesanz and Miranda 2002), working on a change in the public attitude to donation (NHS 2013), encouraging whole family discussions about donation intentions, and promotion of the organ donor register are needed to increase the rate of donation (Hulme et al. 2016). However, opt-out has been considered a potential solution to increasing donation rates in many countries (Ahmad et al. 2019).

As this study shows, work experience obviously influences the rate of the number of organs donated. Croatia established and appointed within each hospital in-house transplant coordinators (Europe 2013). This activity caused an improvement in detection of new cases and management of potential donors. These coordinators are well-trained in organ donation management through internationally recognized and licensed training courses for transplant coordinators (Živčić-Ćosić et al. 2013). Clearly, the impact on organ transplant ability is significant when meeting donor management goals (Malinoski et al. 2012a). Defined donor management protocols can improve organ transplant rates and functions (DuBose and Salim 2008). According to Rosendale et al., the 10.3% increase in the number of organs procured per donor and the 11.3% increase in organs transplanted per donor was measured after

using standard management protocol (Rosendale et al. 2002).

According to our results, coordinators' experiences have a significant effect in the donation rates and success of donation harvest. Similarly, Madhukar et al. showed that meeting the donor management before organ recovery with expanded criteria donors is associated with achieving 3 or more organs transplanted per donor. Meeting donor management goals were associated with achieving ≥ 4 organs transplanted per donor (Malinoski et al. 2012a).

Conclusion

Based on the results, the experiences of the coordinator team were impactful in family decisions regarding organ donation and enhanced the management care of brain death cases. Results indicate that coordinators across Iran need increased training and experiences for effective work in OPUs and RCs. The appointment of people with experience in ICUs and experts in the care of critically ill patients, as well as creating training courses that involve coordinated visits to successful units and the sharing of their experiences with obtaining family consent and management of brain death can have a huge impact on the organ donation rate in Iran.

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Data availability The datasets used and/or analyzed during this research study are available from the corresponding author [Dr. Sanaz Dehghani with email: sanaz_dehghani2002@yahoo.com] on reasonable request.

Declarations

Conflict of interest The authors declare that they have no competing interests.

Consent for publication Since our manuscript does not contain any individual person data, the consent publication is not applicable.

Ethics approval The study was approved by the ethics committee research of Tehran University of Medical Sciences [Ref: IR.TUMS.IKHC.REC. 1400.464]. The data used in this study was anonymized before its use.

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