

ORGAN DONATION AND PROCUREMENT NETWORK MANAGEMENT SYSTEM
A MINI PROJECT REPORT

Submitted by

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INTERNAL EXAMINER

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ABSTRACT

Organ donation and transplantation save countless lives worldwide, but the process of matching donors with recipients and managing organ procurement networks can be complex and challenging. To address this, the Organ Donation and Procurement Network Management System (ODPNMS) is proposed. ODPNMS is a comprehensive software solution designed to streamline and optimize the entire organ donation and transplantation process.

Key features of ODPNMS include a centralized database for storing donor and recipient information, real-time matching algorithms to identify compatible matches, and communication tools to facilitate coordination between healthcare providers, transplant centres, and organ procurement organizations. The system also incorporates advanced security measures to ensure patient confidentiality and compliance with regulatory requirements.

With ODPNMS, healthcare professionals can efficiently manage organ donation and procurement workflows, track the status of transplant candidates and donors, and monitor the allocation and transportation of organs. By improving the efficiency and effectiveness of organ donation and transplantation processes, ODPNMS has the potential to increase the number of successful transplants and ultimately save more lives.

Overall, ODPNMS represents a significant advancement in the management of organ donation and procurement networks, offering a user-friendly platform that enhances collaboration, transparency, and outcomes in the field of organ transplantation

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CHAPTER -1

INTRODUCTION

1.1 PROBLEM STATEMENT:

Despite advancements in medical technology, the organ transplantation process faces numerous challenges, including inefficient communication and coordination between organ procurement organizations, transplant centers, hospitals and thus require a well-organized network to ensure timely matching of donors with recipients, proper allocation of organs, and seamless coordination of transplant procedures. However, existing systems often lack integration, leading to delays, mismatches, and missed opportunities for lifesaving transplants. Therefore, there is a pressing need for a comprehensive organ donation and procurement network management system to streamline the entire process and improve outcomes for patients awaiting organ transplants.

1.2 OBJECTIVE:

The primary objective of the organ donation and procurement network management system is to optimize the process of organ donation, allocation, and transplantation. This system aims to ensure organs are distributed efficiently, equitably, and transparently. It maximizes organ utilization by minimizing wastage and ensures fair distribution based on medical criteria and urgency. The system maintains transparency to build trust among stakeholders and facilitates seamless communication and coordination among hospitals, OPOs, and transplant centers. Additionally, it collects and analyzes data to improve decision-making, policy formulation, and clinical practices.

1.3 MODULES:

- Doctor Management module
- Donar & Recipient Management module
- Hospital Management module
- Data Management and Analysis
- Support Services

CHAPTER – 2

SURVEY OF TECHNOLOGIES

2.1 SOFTWARE DESCRIPTION

The Organ Donation and Procurement Network Management System is designed to streamline and enhance the organ donation process through a comprehensive, integrated software solution. This system leverages advanced technologies to ensure efficient coordination, real-time monitoring, and robust data management across all stages of organ donation and transplantation. The primary components used in this project are MYSQL , Streamlit and Python. These enable the creation of interactive and user- friendly applications. These applications facilitate seamless interaction between database and users.

2.2 LANGUAGES

2.2.1 MYSQL

MySQL, with its comprehensive set of features, plays a pivotal role in the Organ Donation and Procurement Network Management System. It provides the necessary infrastructure to store, manage, and secure data efficiently, ensuring the system is reliable, scalable, and capable of handling the critical requirements of organ donation and transplantation processes. By leveraging MySQL's capabilities, the system can ensure data integrity, enhance performance, provide robust security, and support advanced analytics and reporting, ultimately improving the efficiency and effectiveness of organ donation and procurement operations.

2.2.2 PYTHON

Python can play a significant role in the development and management of an organ donation and procurement network management system due to its versatility, ease of use, and wide range of libraries and frameworks. Python's flexibility, extensive libraries, and ease of integration with other technologies make it an ideal choice for developing an organ donation and procurement network management system. It can handle a wide range of tasks from data management, web development, and automation, to advanced analytics and machine learning, ensuring a robust, efficient, and scalable system.

CHAPTER – 3

REQUIREMENTS AND ANALYSIS

This document outlines the requirements specification for the Organ Donation and Procurement Network Management System (ODPNMS). The system is designed to streamline the organ donation process, improve organ matching and procurement efficiency, and ensure secure handling of sensitive medical information. These requirements are categorized into functional requirements and non- functional requirements.

FUNCTIONAL REQUIREMENTS:

1. User Management

User Registration: Allow new users to register with personal details and medical information.

User Authentication: Provide secure login functionality using username and password.

Role-Based Access Control: Assign roles (e.g., donor, recipient, medical staff) and ensure access control based on roles.

2. Donor and Recipient Management:

Profile Creation: Enable users to create and update their profiles, including medical history and organ details.

Medical Record Integration: Integrate with electronic medical records (EMR) for automatic updates of medical information.

3. Organ Matching

Matching Algorithm: Implement an algorithm to match donors with recipients based on medical compatibility, urgency, and other criteria.

Match Notification: Notify relevant parties when a match is found.

NON- FUNCTIONAL REQUIREMENTS:

1. Performance

Scalability: The system should be scalable to handle an increasing number of users and data.

Response Time: Ensure that the system responds to user actions within an acceptable time frame.

2. Reliability

Uptime: The system should have high availability with minimal downtime.

Backup and Recovery: Implement regular data backups and a disaster recovery plan.

3. Usability

User Interface: Design an intuitive and user-friendly interface.

Accessibility: Ensure the system is accessible to users with disabilities, complying with WCAG standards.

4. Maintainability

Modular Design: Use a modular design approach to simplify maintenance and updates.

Documentation: Provide comprehensive documentation for users and developers.

5. Security

Data Protection: Ensure robust data protection mechanisms to safeguard against breaches.

User Privacy: Implement strict privacy policies to protect user information.

3.1 HARDWARE AND SOFTWARE REQUIREMENTS

HARDWARE REQUIREMENT:

Server: A Server to host the database and handle all the requests. Specifications include a multi-core processor, at least 32GB of RAM, and sufficient storage (eg: 512GB SSD).

Client machines: Any standard computer or laptop that can run python applications which includes dual-core processor, 5GB of RAM and storage.

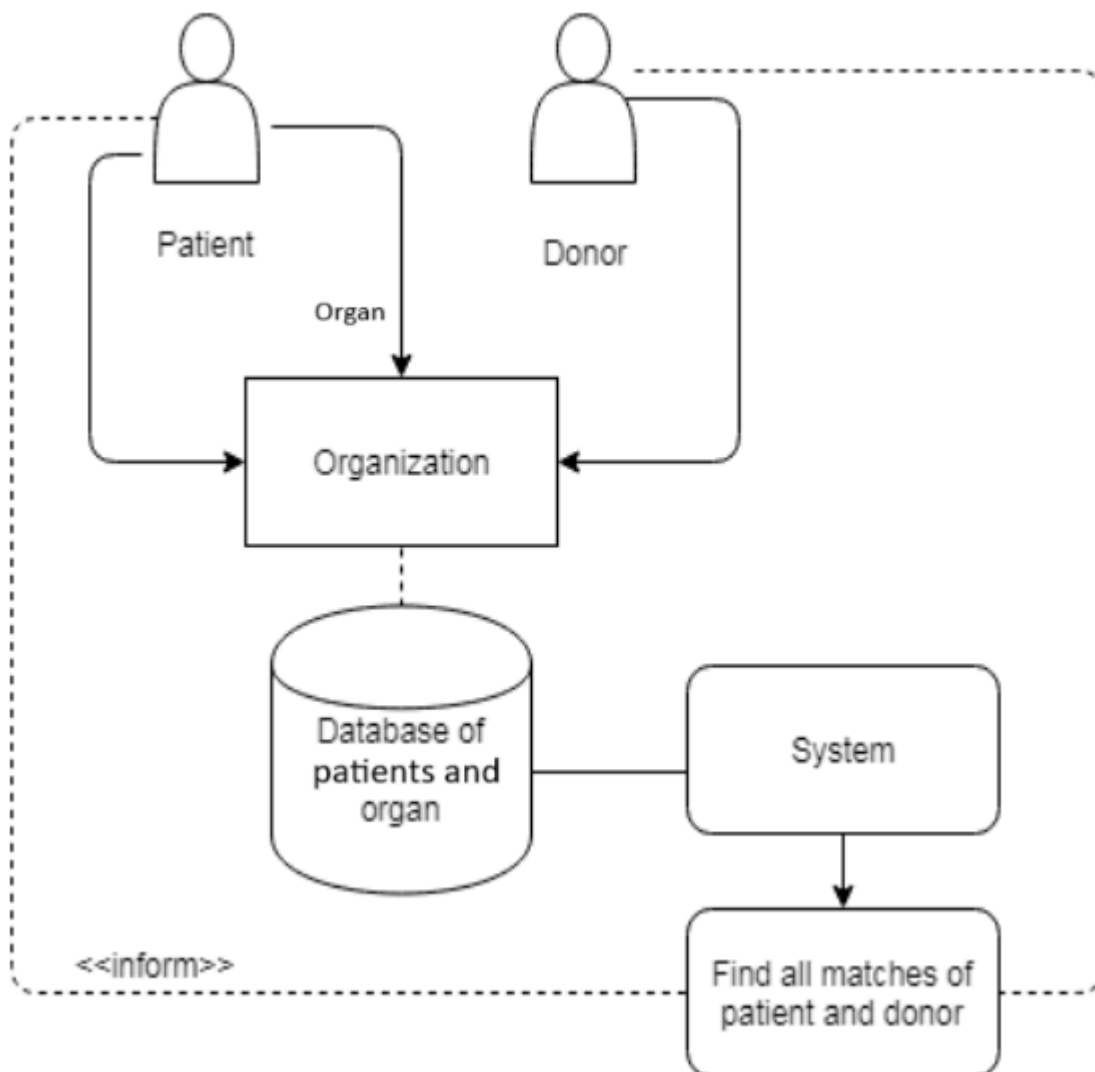
SOFTWARE REQUIREMENT:

Database Management System: MySQL 8.0 or higher

Programming Language: Python 3.x integrated Development Environment (IDLE): Visual Studio Code

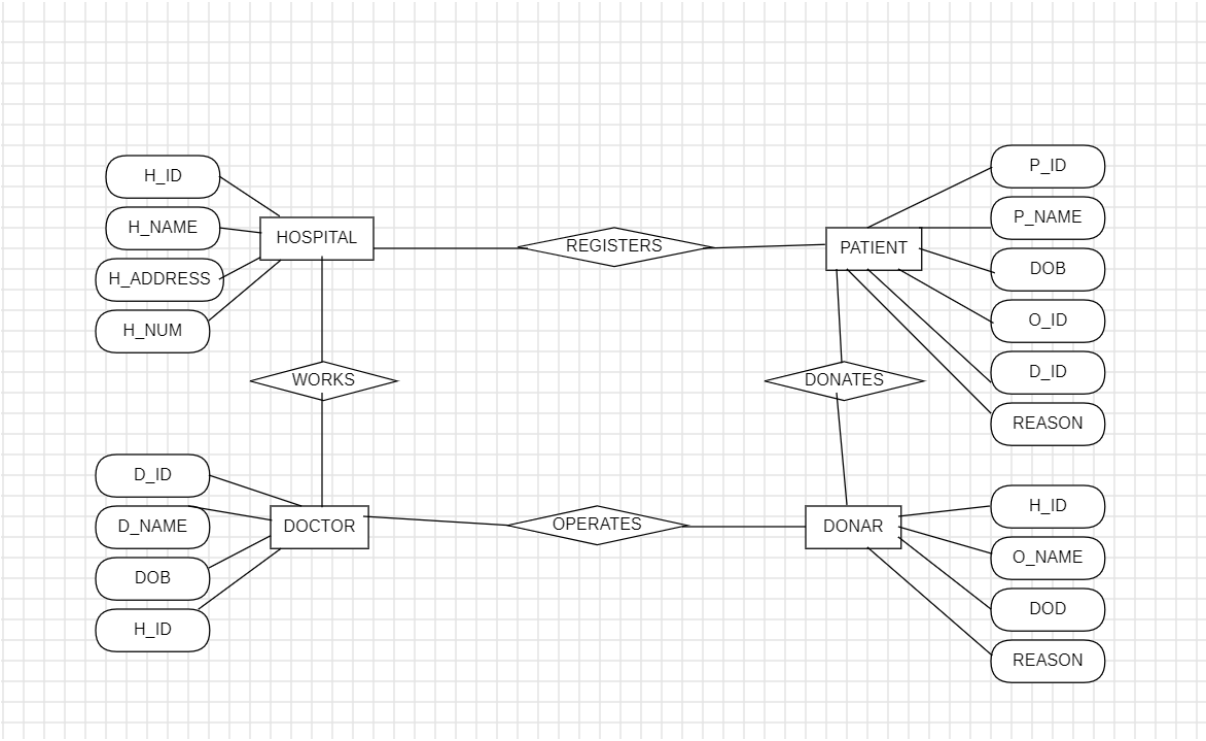
Dependency Management: pip (Python Package Install)

3.2 ARCHITECTURE DIAGRAM:



3.3 ER DIAGRAM

The Entity-relationship diagram represents the database schema for the user login. It includes entities such as donors, recipient, organizations, hospitals and along with their relationship.



PROGRAM CODE

```
import streamlit as st
import mysql.connector

from database_doctor import *
from database_hospital import *
from database_organ import *
from database_patient import *
from create import *
from read import *
from delete import *
from update import *
from front_query import *

def main():
    # Title of the app
    st.title("Organ Donation App")

    # Menu options
    menu = ["Hospital", "Patient", "Doctor", "Donor", "Organ", "front_end_query"]
    crud = ["Add", "View", "Edit", "Remove"]
    crud2 = ["Add", "View"]
    crud4 = ["Add", "View", "count"]
    crud3 = ["View"]
    crud7 = ["Add", "View", "View_date"]

    choice = st.sidebar.selectbox("Menu", menu)

    create_hospital_table()
```

```

# Hospital menu

if choice == "Hospital":
    choice1 = st.sidebar.selectbox("CRUD", crud)
    if choice1 == "Add":
        st.subheader("Enter Hospital Details:")
        create_hospital()
    elif choice1 == "View":
        st.subheader("View Hospital Details")
        read_hospital()
    elif choice1 == "Edit":
        st.subheader("Edit Hospital Details")
        update_hospital()
    elif choice1 == "Remove":
        st.subheader("Delete Hospital Details")
        delete_hospital()
    else:
        st.subheader("Not allowed to edit hospital details")

```

```

# Patient menu

```

```

elif choice == "Patient":
    choice1 = st.sidebar.selectbox("CRUD", crud)
    if choice1 == "Add":
        st.subheader("Enter Patient Details:")
        create_patient()
    elif choice1 == "View":
        st.subheader("View Patient Details")
        read_patient()

```

```

elif choice1 == "Edit":
    st.subheader("Edit Patient Details")
    update_patient() # Ensure this function is defined
elif choice1 == "Remove":
    st.subheader("Delete Patient Details")
    delete_patient()
else:
    st.subheader("About tasks")

```

Doctor menu

```

elif choice == "Doctor":
    choice1 = st.sidebar.selectbox("CRUD", crud4)
    if choice1 == "Add":
        st.subheader("Enter Doctor Details:")
        create_doctor()
    elif choice1 == "View":
        st.subheader("View Doctor Details")
        read_doctor()
    elif choice1 == "count":
        st.subheader("View Doctors in Each Hospital")
        count_doctor()
    else:
        st.subheader("You are only permitted to view & add Doctors details")

```

Donor menu

```

elif choice == "Donor":
    choice1 = st.sidebar.selectbox("CRUD", crud7)

```

```

if choice1 == "Add":
    st.subheader("Enter Donor Details:")
    create_donor()
elif choice1 == "View":
    st.subheader("View Donor Details:")
    read_donor()
elif choice1 == "View_date":
    st.subheader("View Donor Details by Date:")
    view_date() # Ensure this function is defined
else:
    st.subheader("You are only permitted to view & enter donor details")

# Organ menu

elif choice == "Organ":
    choice1 = st.sidebar.selectbox("CRUD", crud3)
    if choice1 == "View":
        st.subheader("View Organ Details")
        read_organ()
    else:
        st.subheader("You can only view and delete organ details")

# Frontend query

elif choice == 'front_end_query':
    st.subheader("Enter query")
    front_query()

else:

```

```
st.subheader("About tasks")
```

```
if __name__ == '__main__':  
    main()
```

```
DELIMITER //
```

```
CREATE PROCEDURE `det_don`(date_of_Donation DATE)
```

```
BEGIN
```

```
    SELECT Donor_ID, organ_donated FROM donor WHERE date_of_Donation =  
    date_of_Donation;
```

```
END//
```

```
DELIMITER;
```

```
CREATE TABLE IF NOT EXISTS `donor`
```

```
(
```

```
    `Donor_ID` int(11) NOT NULL,
```

```
    `organ_donated` varchar(255) DEFAULT NULL,
```

```
    `H_ID` int(11) DEFAULT NULL,
```

```
    `reason_of_donation` text DEFAULT NULL,
```

```
    `date_of_Donation` date DEFAULT NULL,
```

```
    PRIMARY KEY (`Donor_ID`)
```

```
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_general_ci;
```

```
CREATE TABLE IF NOT EXISTS `hospital` (
```

```
    `H_ID` int(11) NOT NULL,
```

```
    `H_Name` varchar(70) NOT NULL,
```

```
    `H_Address` varchar(150) NOT NULL,
```

```
    `Ph_Number` varchar(11) DEFAULT NULL,
```

```
    PRIMARY KEY (`H_ID`)
```

```
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_general_ci;
```

```

CREATE TABLE IF NOT EXISTS `organ_available` (
  `Organ_ID` int(11) NOT NULL,
  `Organ_Name` varchar(100) DEFAULT NULL,
  `Donor_ID` int(11) DEFAULT NULL,
  PRIMARY KEY (`Organ_ID`),
  KEY `Donor_ID` (`Donor_ID`),
  CONSTRAINT `organ_available_ibfk_1` FOREIGN KEY (`Donor_ID`) REFERENCES
`donor` (`Donor_ID`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_general_ci;

```

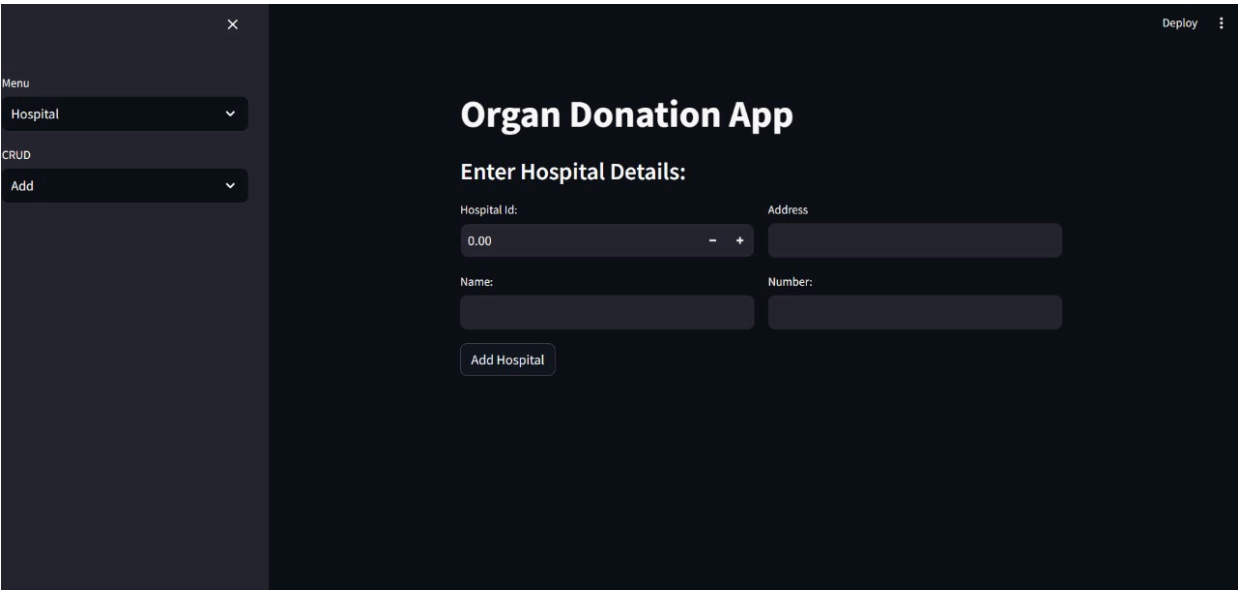
```

CREATE TABLE IF NOT EXISTS `patient` (
  `patient_ID` int(11) NOT NULL,
  `name` varchar(255) DEFAULT NULL,
  `date_of_Birth` date DEFAULT NULL,
  `organ_ID` int(11) DEFAULT NULL,
  `reason_of_request` text DEFAULT NULL,
  `date_of_procurement` date DEFAULT NULL,
  `d_id` int(11) DEFAULT NULL,
  PRIMARY KEY (`patient_ID`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_general_ci;

```


CHAPTER – 5

RESULT AND DISCUSSION



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Menu

Patient

CRUD

View

Deploy

Organ Donation App

View Patient Details

View patient details

	patient_ID	name	date_of_Birth	organ_ID	reason_of_req
0	100	Vamika Manoj	1999-07-14	45,086	Heart Disease
1	121	Sonal Yadav	2024-05-28	30,257	Liver Cirrhosis
2	136	Lavanya Suresh	2001-05-16	50,286	Heart Disease
3	154	Marlin Drake	1960-08-24	25,804	Lung Disease
4	155	Muthu Selvan	1986-02-28	70,150	Kidney failure
5	182	Suman Rao	2024-05-28	50,127	Liver Cirrhosis
6	205	Arjun Mehta	1995-08-25	80,512	Kidney Failure
7	208	Amber Lupin	1988-02-08	10,587	Kidney failure

×

Menu

Doctor

CRUD

View

Deploy

Organ Donation App

View Doctor Details

View all Doctors

	H_ID	D_Name	DOB	D_ID
0	101	Lolita	1983-02-15	125
1	100	Aruna Madhan	2024-05-28	158
2	101	David Stork	1997-05-07	175
3	101	Yadav	1997-10-27	225
4	100	Abraham	1998-05-17	245

×

Menu

Donor

CRUD

View

Deploy

⋮

Organ Donation App

View Donor Details:

View all Donors

	Donor_ID	organ_donated	H_ID	reason_of_donation	date_of_donation
0	2,187,936	Heart	100	Relative in need	2024-05-28
1	3,855,739	Kidney	105	For their mother's surgery	2024-04-25
2	5,619,634	Eye	104	As an act of social service	2024-05-20
3	7,295,879	Liver	103	for a relative in need	2024-04-20
4	9,750,251	heart	0	A relative in need	2024-05-28

CHAPTER – 7

CONCLUSION

An ODPNMS significantly enhances the organ donation and transplantation process, making it more efficient, transparent, and fair. While the system offers substantial benefits, addressing the associated challenges through careful planning, stakeholder engagement, and continuous improvement is crucial for achieving its full potential. By leveraging technology and adhering to ethical standards, the ODPNMS can save more lives and build a trustworthy organ donation ecosystem.

The ODPNMS is a vital tool in enhancing the organ donation and transplantation process, offering a more efficient, transparent, and equitable system. Its successful implementation can save more lives, improve public confidence, and create a robust organ donation network. By addressing the associated challenges and focusing on continuous improvement, the ODPNMS can significantly contribute to the betterment of healthcare systems and the well-being of patients in need of organ transplants.

CHAPTER – 8

REFERENCES

References on Organ Donation and Procurement Network Management System (ODPNMS)

1. OPTN (Organ Procurement and Transplantation Network)

- OPTN manages the national transplant waiting list and ensures fair allocation of organs. More information can be found on their official website:

[OPTN](<https://optn.transplant.hrsa.gov/>)

2. UNOS (United Network for Organ Sharing)

- UNOS administers the national organ transplant system under contract with the federal government. For detailed insights into their management system, visit:

[UNOS](<https://unos.org/>)

3. Health Resources & Services Administration (HRSA)

- HRSA oversees organ donation and transplantation in the United States. Detailed information on their programs and regulations is available at: [HRSA](<https://www.hrsa.gov/>)

4. "Organ Donation and Transplantation: Ethical, Legal and Psychosocial Aspects" (Book)

- Edited by David Price, Anne-Maree Farrell, and Muireann Quigley, this book provides comprehensive coverage of ethical, legal, and psychosocial aspects of organ donation and transplantation.

5. "Strategies to Increase Organ Donor Registrations" (Journal Article).

- Siegel, J.T., Alvaro, E.M., Crano, W.D., Gonzalez, A.V., & Tang, J.C. (2008). Strategies to increase organ donor registrations: The role of online campaigns. *Health Communication*, 23(4), 372-379.

6. "Improving Organ Donation and Transplantation in the EU: A Report from the European Union Committee of Experts" (EU Report).

- This report discusses the strategies and recommendations for improving organ donation systems within the EU. The full report is available at: [European Commission] (https://ec.europa.eu/health/system/files/2019-11/organs_report_en_0.pdf)

7. "Impact of Organ Procurement Organizations on Organ Donation and Transplantation" (Journal Article)

- Goldberg, D.S., & Halpern, S.D. (2013). The impact of organ procurement organizations on organ donation and transplantation. *Health Affairs*, 32(10), 1564-1572.

8. "The Role of Information Technology in the Management of Organ Transplantation" (Journal Article)

- Ozcan, Y.A., & Begun, J.W. (1998). The role of information technology in the management of organ transplantation. *Journal of Healthcare Management*, 43(6), 505-518.