From Admission to Discharge: Understanding the Transplant Patient Journey with German Statutory Health Insurance Claims Data

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Introduction

- For many people whose own organs have failed, organ donation offers the chance for a new life. In case of an accident or disease, a transplant is often the only treatment that can prevent patients from dying or significantly improve their quality of life.[1]
- In Germany, there are 43 transplant centers that perform transplants and register patients for the waiting list.[1]
- In 2024, the German Organ Procurement Organization recorded a total of 3,701 organ transplants in Germany. Thereof, 2,855 organs were donated post-mortem by 953 donors. The most common type of transplant was kidney, followed by lung and heart transplant.[1]
- This study aimed to gain insights into the patient journey for transplant recipients within the hospital setting by leveraging German statutory health insurance claims data.

Methods

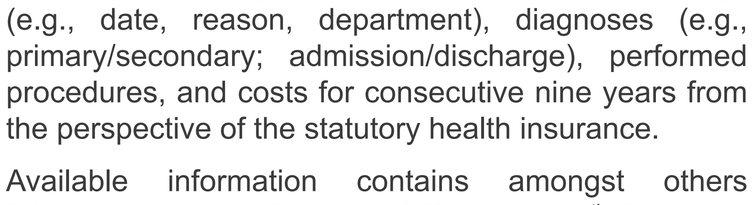
- A retrospective claims data analysis was conducted using inpatient data from the Institute for Applied Health Research Berlin GmbH (InGef) research database, which consists of anonymized longitudinal data of about 10 million individuals. Outcomes were analyzed in the time period from 2019 to 2023.
- German procedure classification (OPS) code 5-555 was used to identify kidney transplant cases, 5-335 for lung transplant cases, and 5-375 for heart transplant cases.
- Hospital data enable a comprehensive overview of the patient journey, including information on patient characteristics (e.g., age, sex), admission/discharge (e.g., date, reason, department), diagnoses (e.g., primary/secondary; admission/discharge), performed procedures, and costs for consecutive nine years from the perspective of the statutory health insurance.
- Available information contains amongst others International Classification of Disease, 10th Revision, German Modification (ICD-10-GM) diagnoses, OPS codes, and Diagnosis Related Group (DRG) on an individual patient level and can be analyzed longitudinally.

Results

Transplant cases

- Between 2019 and 2023, a total of 759 kidney (median age: 55 years, male: 62%), 130 lung (median age: 57 years, male: 66%), and 120 heart (median age: 53 years, male: 73%) transplant cases (≥18 years) were identified (see **Figure 1**).

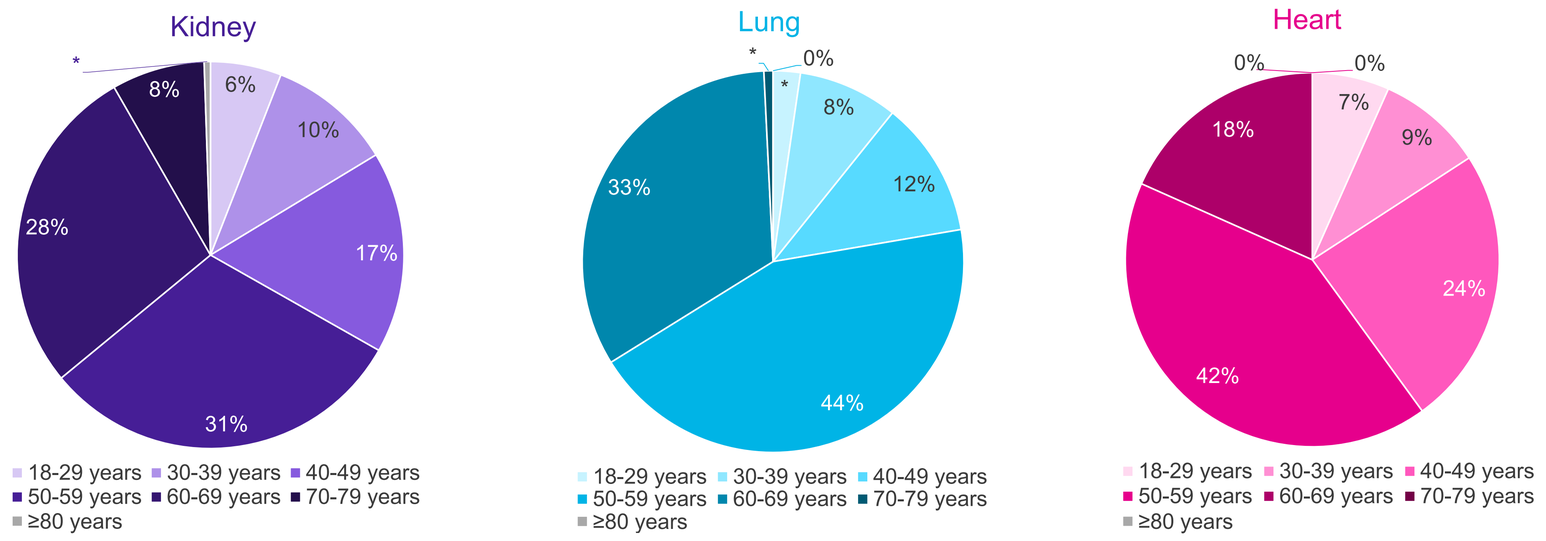
Figure 1. Transplant cases in the InGef research database between 2019 and 2023



- Most transplants were performed in the age group 50-59 years (31% of kidney, 44% of lung, and 42% of heart transplants). The age group distribution of kidney, lung, and heart transplant cases is shown in **Figure 2**.

Results (cont.)

Figure 2. Age distribution of transplant cases

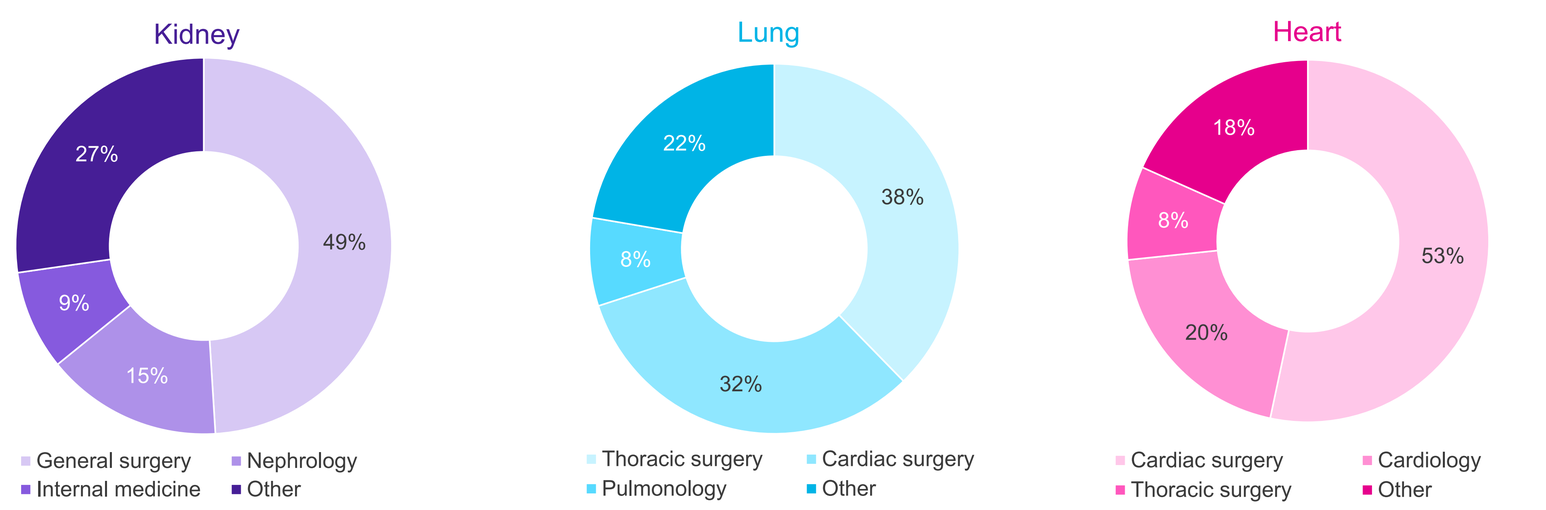


** Patient count of <5. Due to data protection regulations, they cannot be reported.*

Hospital admission

- Over half of the kidney (57%) and lung (63%) transplant cases were hospitalized via the emergency department.
- Most of the patients undergoing kidney, lung, and heart transplantation were admitted to the general surgery (49%), thoracic surgery (38%), and cardiac surgery (53%) departments, respectively. Further admission departments in kidney transplants were other, nephrology, and internal medicine, whereas cardiac surgery, other, and pulmonology were most frequently in lung transplants. For heart transplants, cardiology, other, and thoracic surgery were the main admission departments (see **Figure 3**).
- The admission diagnoses were chronic kidney disease (92% of kidney transplant cases), other interstitial pulmonary diseases and other chronic obstructive pulmonary disease (29% and 26% of lung transplant cases, respectively) as well as heart failure and cardiomyopathy (28% and 27% of heart transplant cases, respectively).

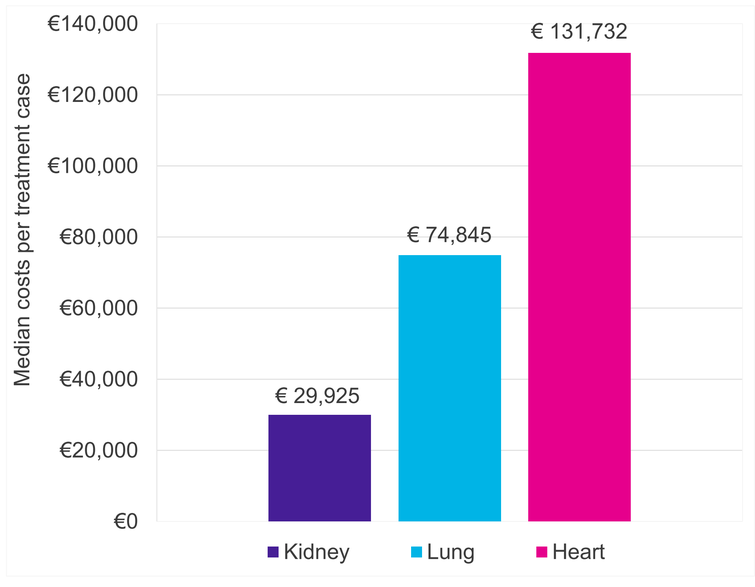
Figure 3. Admission department of transplant cases



Healthcare resource utilization and healthcare costs

- The median length of stay in the hospital was 20 (SD=19), 33 (SD=33), 77 (SD=83) days for kidney, lung, and heart transplant cases, respectively.
- Median healthcare costs per treatment case based on reimbursed DRGs were €29,925 (Q1 - Q3): €23,214 - €41,340) in kidney, €74,845 (Q1 - Q3: €59,188 - €123,319) in lung and €131,732 (Q1 - Q3: €98,859 - €234,079) in heart transplant cases (see **Figure 4**).

Figure 4. Healthcare costs



Hospital discharge

- Treatment was completed as planned in 67%, 14%, and 29% of kidney, lung, and heart transplant cases, respectively.
- About 1% of kidney, 58% of lung, and 33% of heart transplant cases were discharged to a rehabilitation center.
- 1%, 8%, and 12% of kidney, lung, and heart transplant cases, respectively, deceased during the hospitalization.
- Main discharge diagnoses were chronic kidney disease (94% of kidney transplant cases), other interstitial pulmonary diseases (35% of lung transplant cases), and cardiomyopathy (45% of lung transplant cases).
- Discharge departments were general surgery (49% of kidney transplant cases), thoracic surgery and heart surgery (38% and 31% of lung transplant cases, respectively), and cardiac surgery (51% of heart transplant cases).

Conclusion

- Depending on the transplanted organ, patients undergo various treatments in different departments of the hospital with heart transplant cases remaining in the hospital the longest and incurring the highest healthcare costs compared to kidney and lung transplant cases.
- Data on hospitalizations included in the InGef research database provides in-depth insights into the patient journey, which can be enriched by incorporating further data domains available such as outpatient services, prescriptions, sick leave as well as aids and remedies.

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References

1. Deutsche Stiftung Organtransplantation (DSO). Jahresbericht Organspende und Tranplantation in Deutschland 2024. URL: https://www.dso.de/SiteCollectionDocuments/DSO-Jahresbericht%202024.pdf. Accesses on: 09/29/2025.

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