**The transfers table**

**Table source:** Hospital database.

**Table purpose:** Physical locations for patients throughout their hospital stay.

**Number of rows:** 261,897

**Links to:**

* PATIENTS on SUBJECT\_ID
* ADMISSIONS on HADM\_ID
* ICUSTAYS on ICUSTAY\_ID

**Important considerations**

* The ICUSTAYS table is derived from this table.
* Care units are defined based off the WARDID being associated with an ICU cost center.
* ICUs in the Beth Israel have moved throughout the years, and consequently the same WARDID may be considered as an ICU for patient A but not an ICU for patient B.

**Table columns**

| **Name** | **Postgres data type** |
| --- | --- |
| ROW\_ID | INT |
| SUBJECT\_ID | INT |
| HADM\_ID | INT |
| ICUSTAY\_ID | INT |
| DBSOURCE | VARCHAR(20) |
| EVENTTYPE | VARCHAR(20) |
| PREV\_CAREUNIT | VARCHAR(20) |
| CURR\_CAREUNIT | VARCHAR(20) |
| PREV\_WARDID | SMALLINT |
| CURR\_WARDID | SMALLINT |
| INTIME | TIMESTAMP(0) |
| OUTTIME | TIMESTAMP(0) |
| LOS | INT |

**Detailed Description**

SUBJECT\_ID, HADM\_ID, ICUSTAY\_ID

Identifiers which specify the patient: SUBJECT\_ID is unique to a patient, HADM\_ID is unique to a patient hospital stay and ICUSTAY\_ID is unique to a patient ICU stay.

DBSOURCE

DBSOURCE contains the original ICU database the data was sourced from. Patients admitted between 2001 - 2008 had their data managed by the CareVue information system, represented in this column as ‘carevue’. Patients admitted between 2008 - 2012 had their data managed by the Metavision system, represented in this column as ‘metavision’. Knowing the database source is important as the data archiving for these two databases differs in some cases.

EVENTTYPE

EVENTTYPE describes what transfer event occurred: ‘admit’ for an admission, ‘transfer’ for an intra-hospital transfer and ‘discharge’ for a discharge from the hospital.

PREV\_CAREUNIT, CURR\_CAREUNIT

PREV\_CAREUNIT contains the care unit in which the patient previously resided. CURR\_CAREUNIT contains the care unit in which the patient currently resides. The care unit is defined based upon the ward: if the ward is an ICU cost center, then the care unit defines the type of ICU. If the ward is *not* an ICU then in most cases the care unit is null. There are one or two exceptions to this rule. For example, NWARD is a ward for newborns.

The INTIME and OUTTIME of the transfer event correspond to the CURR\_CAREUNIT. The PREV\_CAREUNIT for each row is provided for convenience, and is identical to the CURR\_CAREUNIT of the previous row (assuming the event is not an admission).

Care units include the following:

| **Care unit** | **Description** |
| --- | --- |
| CCU | Coronary care unit |
| CSRU | Cardiac surgery recovery unit |
| MICU | Medical intensive care unit |
| NICU | Neonatal intensive care unit |
| NWARD | Neonatal ward |
| SICU | Surgical intensive care unit |
| TSICU | Trauma/surgical intensive care unit |

PREV\_WARDID, CURR\_WARDID

PREV\_WARDID and CURR\_WARDID contain the previous and current ward in which the patient stayed. Note that the grouping of physical locations in the hospital database is referred to as a ward. Though in practice ICUs are not referred to as wards, the hospital database technically tracks ICUs as “wards with an ICU cost center”. As a result, each ICU is associated with a WARDID, but not every WARDID is an ICU.

INTIME, OUTTIME

INTIME provides the date and time the patient was transferred into the current care unit from the previous care unit. OUTTIME provides the date and time the patient was transferred out of the current care unit.

LOS

LOS is the length of stay for the patient for the given ward stay, which may be within or outside of the ICU.

### \*\*Strengths and Uses\*\*

1. \*\*Identifying ICU-Type Subsets\*\*:

- `CURR\_CAREUNIT` allows filtering of specific ICU types (e.g., `MICU`, `SICU`).

- This can help focus on patient populations relevant to your analysis (e.g., cardiac ICU patients for cardiac studies).

2. \*\*Tracking Movement and Duration\*\*:

- Columns like `INTIME`, `OUTTIME`, and `LOS` (length of stay) provide granular movement details.

- Useful for exploring transitions between care units and their potential impact on outcomes (e.g., mortality).

3. \*\*Weekend/Weekday Admissions\*\*:

- The `INTIME` and `OUTTIME` timestamps can be used to flag whether patients were admitted during weekends or weekdays, directly supporting \*\*Aim 2\*\* of your project.

4. \*\*Supporting Missing Data Investigations\*\*:

- If ICU identifiers (`ICUSTAY\_ID`) or other key data are missing in other tables, \*\*`transfers`\*\* can serve as a secondary source for validation.

5. \*\*Intra-ICU Transfers\*\*:

- Records patients who change locations within the ICU (e.g., first and last wards differ).

- These patients may require specific handling if outcomes are influenced by transitions within the ICU.

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### \*\*Challenges and Limitations\*\*

1. \*\*High Missingness for ICU-Specific Identifiers\*\*:

- \*\*`ICUSTAY\_ID`\*\*: 66.51% missingness limits direct linking to ICU-level tables like `vitals\_hourly` or `labs\_hourly`.

2. \*\*Complexity in Handling Transfers\*\*:

- Patients with multiple transfers might need aggregation or specific filtering (e.g., only the first ICU stay).

- Requires careful handling to avoid double-counting or inconsistencies.

3. \*\*Potential Redundancy\*\*:

- The \*\*`icustays`\*\* table is derived from \*\*`transfers`\*\*, so much of the ICU-specific data may already exist in \*\*`icustays`\*\*.

4. \*\*Granular Data Not Always Necessary\*\*:

- Detailed intra-ICU movements might not contribute significantly to the project's main objectives unless a specific hypothesis involves care unit transitions.

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### \*\*Relevance to Project Aims\*\*

#### \*\*Aim 1: Predicting Mortality Based on First 24-Hour ICU Data\*\*

- \*\*Direct Use\*\*:

- \*\*`CURR\_CAREUNIT`\*\*: Include ICU-type as a categorical feature (e.g., MICU vs. SICU).

- \*\*`LOS`\*\*: Cross-check or validate length of ICU stay.

- \*\*Secondary Use\*\*:

- Explore whether intra-ICU movements in the first 24 hours are associated with mortality.

#### \*\*Aim 2: Weekend/Weekday Admissions\*\*

- \*\*Critical Use\*\*:

- Use `INTIME` to flag admissions during weekends vs. weekdays.

- Investigate whether transfers occur disproportionately on weekends, influencing care quality or outcomes.

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### \*\*Recommendations for Use in Your Project\*\*

1. \*\*Use as a Supplementary Table\*\*:

- Leverage \*\*`transfers`\*\* for:

- Filtering by ICU type (`CURR\_CAREUNIT`).

- Adding weekend/weekday admission flags.

- Cross-validating ICU admission times (`INTIME`) with \*\*`icustays`\*\*.

2. \*\*Exclude Patients Without ICU Data\*\*:

- Drop rows with missing `ICUSTAY\_ID` when merging with ICU-specific tables to maintain consistency.

3. \*\*Aggregate and Simplify\*\*:

- If analyzing patients with multiple transfers, aggregate data to focus on the \*\*first ICU stay\*\* or summarize transitions in a binary feature (e.g., "Transferred Within ICU: Yes/No").

4. \*\*Optional Exploration\*\*:

- Examine the impact of intra-ICU transfers (e.g., `first\_wardid != last\_wardid`) on outcomes like mortality or length of stay.

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### Updated Workflow Incorporating `transfers`

- \*\*During Merging\*\*:

- Include \*\*`CURR\_CAREUNIT`\*\* in the master dataset to capture ICU type.

- Use `INTIME` to verify or adjust admission times from other tables.

- \*\*Feature Engineering\*\*:

- Create new features like:

- ICU type (`CURR\_CAREUNIT` as categorical).

- Weekend admission flag (`weekdays(INTIME) %in% c("Saturday", "Sunday")`).

- Binary feature for intra-ICU transfers.

- \*\*Data Validation\*\*:

- Compare `ICUSTAY\_ID` and `LOS` with \*\*`icustays`\*\* for consistency.