**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.

### \*\*优势和用途\*\*

1. \*\*识别 ICU 类型子集\*\*：

- `CURR\_CAREUNIT` 允许筛选特定的 ICU 类型（例如 `MICU`、`SICU`）。

- 这有助于关注与您的分析相关的患者群体（例如，用于心脏研究的心脏 ICU 患者）。

2. \*\*跟踪移动和持续时间\*\*：

- 诸如 `INTIME`、`OUTTIME` 和 `LOS`（住院时间）之类的列提供了详细的移动详细信息。

- 有助于探索护理单元之间的过渡及其对结果（例如死亡率）的潜在影响。

3. \*\*周末/工作日入院\*\*：

- `INTIME` 和 `OUTTIME` 时间戳可用于标记患者是在周末还是工作日入院，直接支持项目的\*\*目标 2\*\*。

4. \*\*支持缺失数据调查\*\*：

- 如果其他表中缺少 ICU 标识符（`ICUSTAY\_ID`）或其他关键数据，\*\*`转移`\*\* 可作为验证的辅助来源。

5. \*\*ICU 内转移\*\*：

- 记录在 ICU 内改变位置的患者（例如，第一个和最后一个病房不同）。

- 如果结果受到 ICU 内转变的影响，这些患者可能需要特殊处理。

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### \*\*挑战和限制\*\*

1. \*\*ICU 特定标识符的高缺失率\*\*:

- \*\*`ICUSTAY\_ID`\*\*: 66.51% 的缺失率限制了直接链接到 ICU 级表，如 `vitals\_hourly` 或 `labs\_hourly`。

2. \*\*处理转移的复杂性\*\*:

- 多次转移的患者可能需要聚合或特定过滤（例如，仅第一次 ICU 住院）。

- 需要小心处理以避免重复计算或不一致。

3. \*\*潜在冗余\*\*:

- \*\*`icustays`\*\* 表源自 \*\*`transfers`\*\*，因此许多 ICU 特定数据可能已经存在于 \*\*`icustays`\*\* 中。

4. \*\*并非总是需要详细数据\*\*：

- 除非特定假设涉及护理单元转换，否则详细的 ICU 内移动可能不会对项目的主要目标产生重大贡献。

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### \*\*与项目目标的相关性\*\*

#### \*\*目标 1：根据最初 24 小时 ICU 数据预测死亡率\*\*

- \*\*直接使用\*\*：

- \*\*`CURR\_CAREUNIT`\*\*：将 ICU 类型作为分类特征（例如 MICU 与 SICU）。

- \*\*`LOS`\*\*：交叉检查或验证 ICU 停留时间。

- \*\*次要使用\*\*：

- 探索最初 24 小时内的 ICU 内移动是否与死亡率有关。

#### \*\*目标 2：周末/工作日入院\*\*

- \*\*关键使用\*\*：

- 使用 `INTIME` 标记周末与工作日的入院情况。

- 调查周末是否不成比例地发生转诊，从而影响护理质量或结果。

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### \*\*项目使用建议\*\*

1. \*\*用作补充表\*\*：

- 利用\*\*`transfers`\*\*进行以下操作：

- 按 ICU 类型 (`CURR\_CAREUNIT`) 进行过滤。

- 添加周末/工作日入院标志。

- 使用\*\*`icustays`\*\*交叉验证 ICU 入院时间 (`INTIME`)。

2. \*\*排除没有 ICU 数据的患者\*\*：

- 与 ICU 特定表合并时，删除缺少 `ICUSTAY\_ID` 的行以保持一致性。

3. \*\*汇总和简化\*\*：

- 如果分析多次转院的患者，则汇总数据以重点关注\*\*第一次 ICU 住院\*\*或总结二元特征中的转变（例如，“ICU 内转院：是/否”）。

4. \*\*可选探索\*\*：

- 检查 ICU 内转院（例如 `first\_wardid != last\_wardid`）对死亡率或住院时间等结果的影响。

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### 更新了包含 `transfers` 的工作流程

- \*\*合并期间\*\*：

- 在主数据集中包含 \*\*`CURR\_CAREUNIT`\*\* 以捕获 ICU 类型。

- 使用 `INTIME` 验证或调整其他表中的入院时间。

- \*\*特征工程\*\*：

- 创建新特征，例如：

- ICU 类型（`CURR\_CAREUNIT` 作为分类）。

- 周末入院标志（`weekdays(INTIME) %in% c("Saturday", "Sunday")`）。

- ICU 内转院的二进制特征。

- \*\*数据验证\*\*：

- 将 `ICUSTAY\_ID` 和 `LOS` 与 \*\*`icustays`\*\* 进行比较，以确保一致性。