**Script Documentation: Mechanical Ventilation Durations**

* **Overview**: This SQL script calculates the duration of mechanical ventilation events by identifying sequential ventilation settings, extubation, and oxygen therapy. The result is a table that tracks the start and end times of each ventilation period for further analysis, such as total ventilation time.
* **MIMIC Version**: [Insert MIMIC version]
* **Key References**:
  + Builds on the ventilation\_classification table from a previous query.
  + Utilizes time-based logic to determine the start and end of mechanical ventilation events.
* **Logic Summary**:
  + **Event Detection**: The script identifies the presence of mechanical ventilation based on recorded settings, marking the start of new events when necessary (e.g., extubation, oxygen therapy, or prolonged time without ventilation settings).
  + **Ventilation Aggregation**: Ventilation settings are aggregated into single continuous "events" whenever they are within 8 hours of each other.
  + **Duration Calculation**: The duration of each mechanical ventilation event is calculated, including the start and end times.
* **Process Steps**:
  + **Initial Classification (vd0)**:
    - Pulls data from ventilation\_classification and calculates the time difference between consecutive ventilation settings (charttime\_lag).
    - Identifies instances of mechanical ventilation, extubation, and oxygen therapy.
  + **Calculate Ventilation Duration (vd1)**:
    - Calculates the time duration between mechanical ventilation events using DATETIME\_DIFF.
    - Determines whether each instance is part of an ongoing ventilation event or a new one based on extubation, oxygen therapy, or gaps of more than 8 hours.
  + **Event Numbering (vd2)**:
    - Uses a cumulative sum (newvent) to assign unique ventilation event numbers (ventnum) to continuous sequences of mechanical ventilation settings.
    - Ensures that each mechanical ventilation event is appropriately grouped.
  + **Final Duration Calculation**:
    - For each ventnum, calculates the start and end time (min(charttime) and max(charttime)) and computes the total duration in hours.
    - Only considers cases where max(mechvent) = 1, ensuring that the patient was mechanically ventilated at least once during the event.
* **Output**:
  + The table ventilation\_durations contains:
    - icustay\_id: The ICU stay ID.
    - ventnum: A sequential number for each mechanical ventilation event.
    - starttime: The start time of the ventilation event.
    - endtime: The end time of the ventilation event.
    - duration\_hours: The total duration of the ventilation event in hours.

**Example Query**:  
sql  
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SELECT \* FROM ventilation\_durations WHERE duration\_hours > 24;

* **Important Notes**:
  + The script ignores ventilation periods shorter than 8 hours if no new ventilation settings are recorded.
  + Extubation and initiation of oxygen therapy are treated as markers for the end of a ventilation event.
  + This script assumes the existence of a well-formed ventilation\_classification table.
* **Conclusion**: This script provides accurate mechanical ventilation event durations, enabling analysis of ventilation trends and patient outcomes based on how long they were ventilated. It is essential for studies focusing on ventilation management and patient recovery timelines.