

## **Other data processing modules**

Pro-Drug Level, Pro-Laboratory, and Pro-Demographic process structured drug level, laboratory data, and demographic data, respectively. Pro-Drug Level includes a step to match date/time of sampling time and drug concentration levels, since sampling time and drug level data can come from two different data sources. This module also checks whether there are multiple sets of drug level data on the same date/time for each patient, and if so, it selects only one set using a specific rule given by the investigator (e.g., select the set with the largest number of drug levels available). Pro-Laboratory merges several files as laboratory data can come as different files (e.g., serum creatinine and albumin). The module also imputes missing values with a time window rule as default method; e.g., it imputes a missing value with non-missing value found nearest to the time at which the drug level was measured. Pro-Demographic includes a step to refine a cohort based on inclusion/exclusion criteria if needed (e.g., exclude subjects with in-hospital death or extracorporeal membrane oxygenation). This module also generates variables based on other available variables if needed (e.g., ICU length of stay, time since surgery, etc.).