

Estimation of prescription durations based on the parametric Waiting Time Distribution

Henrik Støvring, MSc, PhD, DMSc
Associate Professor
Department of Public Health
Aarhus University

Determining the duration of treatment associated with a redeemed prescription as observed in electronic pharmacoepidemiologic databases is a fundamental problem in pharmacoepidemiologic research. With recent developments of the parametric Waiting Time Distribution (WTD), it has become possible to estimate such durations using regression-like statistical techniques without relying on traditional decision rules, which are prone to bias and lack theoretical underpinnings. In this course, I will introduce the parametric WTD and demonstrate how it may be used to estimate prescription durations. The focus will be on application of the method, understanding the estimated parameters and how to examine assumptions associated with the model.

Overview of the lectures (12.30–16.30 including breaks):

1. The fundamental problem of estimating prescription durations in pharmacoepidemiology with routinely collected information on prescription redemptions (PE data).
 - Why fixed decision rules for durations result in misclassification and bias of subsequent estimates
 - An overview of some simple strategies for visualizing time between prescriptions
 - Why length bias is an ugly beast rearing its head unnoticed in many disguises
 - A first definition of the Waiting Time Distribution (WTD)
2. The parametric WTD – its definition and estimation
 - Exploiting length bias to identify the distribution of time between prescription redemptions of users continuing treatment
 - A two-component mixture model that allows maximum likelihood estimation of prescription durations
 - A first example on how to estimate prescription durations using Stata and the add-on package - wtdttt-
 - Making sense of the estimated parameters and how they can be used in analyses of PE data (prevalence, incidence, duration of prescriptions)
 - A closer look at the requirements for the parametric WTD to work properly
3. Flipping and extending the parametric WTD – the reverse WTD
 - Estimation of stopping and current prevalence
 - Introduction of covariates
 - Interpretation of estimated coefficients in the three different regression equations that make up the combined model
 - Investigating assumptions made in the regression analysis using the new opportunities for regression analysis
4. Applying the WTD in real world settings - a worked example (participants are encouraged to bring their own dataset, but can also work on an anonymized dataset which will be provided to them)