

## An R tutorial on the Waiting Time Distribution for estimating dispensation length to compute medication adherence

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### Introduction

Electronic data on medication dispensations are widely used to conduct drug-utilization, effectiveness and safety studies. When only dates of dispensations are available, a necessary first step in medication adherence studies is to estimate dispensation lengths, i.e. how long an individual is considered to be in treatment after the dispensation. The parametric waiting time distribution (WTD) is a data-driven alternative<sup>1</sup> to the commonly used strategy of using the Defined Daily Dose (DDD) assigned by the WHO.

### Aim

To provide a step-by-step guide for implementing the WTD in R to estimate the dispensation length using dispensation records.

### Methods

The WTD is a frequency distribution of either the time to the first dispensation for each individual within a fixed time window or the time from their last dispensation within the time window to the end (reverse WTD). The duration is estimated as a pre-specified percentile of the distribution of time between subsequent dispensations, representing the time for that proportion of continuous users to get a new dispensation. This method allows to tailor the prediction of the dispensation length to important variables, such as age, gender, and comorbidities.

### Results

An R package is now available, joining the existing Stata module<sup>2</sup>.

### Conclusion

The rWTD is a statistically robust, data-driven method for assigning duration to pharmacy dispensations. Its strength lies in the possibility of estimating tailored durations by considering relevant covariates. The present work is a tutorial on the application of the WTD, providing a step-by-step guide for implementation in R, with a detailed explanation of the function output.

### References

- 1 Pottegård A, Hallas J. Assigning exposure duration to single prescriptions by use of the waiting time distribution. *Pharmacoepidemiol Drug Saf* 2013; **22**: 803–9.

- 2 Stovring H. WTD: Stata module to produce analysis of waiting time distribution. *Statistical Software Components* 2009; published online April 3.  
<https://ideas.repec.org/c/boc/bocode/s451001.html> (accessed July 6, 2024).