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# JOINT MODELLING OF LONGITUDINAL CLINICAL PARAMETERS AND COMPETING RISK DATA IN PERITONEAL DIALYSIS PATIENTS

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## ⌗ INTRODUCTION

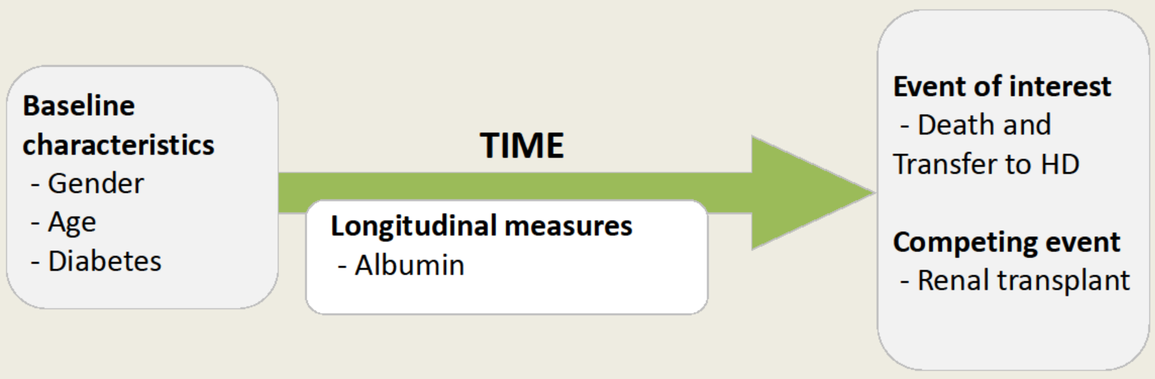
The evaluation of a peritoneal dialysis program may be performed using indicators, such as patient survival, technique survival and combined survival. The analyses of these indicators are obtained considering several types of information concerning patient's health condition, based on baseline covariates and on longitudinal and time-to-event outcomes. At start of peritoneal dialysis, baseline characteristics, such as gender, age or diabetes, are recorded. During the follow-up, longitudinal (repeated) measures, of a clinical parameter, such as albumin, are recorded in order to obtain a longitudinal profile of patient status. Time-to-event outcome, characterized by the follow-up until a specific event of interest occurs is also recorded. It is only possible to observe the first outcome (and consequently the first time-to-event) from a set of possible competing events: death, transfer to haemodialysis and renal transplant. In the majority of peritoneal studies, these two types of outcomes (longitudinal and time-to-event outcomes) have been analysed separately. However, when these two types of outcomes are associated a joint modelling approach of longitudinal and time-to-event outcomes in a competing risks framework is mandatory. In this statistical approach, a longitudinal submodel and a survival submodel are defined in order to evaluate the association between longitudinal and time-to-event outcomes.

## ⌗ OBJECTIVES

To evaluate the relationship between baseline characteristics, albumin scores (longitudinal outcome) and combined survival (time-to-event outcome) taking competing risks into account in peritoneal dialysis patients. The relevance of joint modelling of longitudinal and competing risk survival data in the evaluation of peritoneal dialysis programs is discussed.

## ⌗ METHODS

Sample is composed by 160 patients who started peritoneal dialysis therapy between 1999 and 2013. Diabetes, gender and age were considered as baseline covariates. Longitudinal measures of albumin scores were recorded since January 2008. Death and transfer to haemodialysis were combined and considered as the event of interest, with renal transplantation as competing risk event.




## ⌗ RESULTS

The longitudinal submodel suggested that age and sex were statistically significant predictors of mean albumin score: while males present higher average level of albumin, younger patients present a lower average albumin level. The average albumin level remains approximately constant along time. Analysing the survival submodel, albumin was associated with time to the event of interest, meaning that a decrease in albumin score corresponds to an increase in the risk of death/transfer to haemodialysis. However, no evidence of association between albumin and time to renal transplantation was found. Age was identified as a statistical significant risk factor for the competing risk event, but not for the combined survival.

Table 1: Parameter estimates for joint model fitted to albumin (longitudinal outcome) and time to peritoneal dialysis treatment failure (survival outcome) in the presence of competing risks.

| | | Joint modelling | |
|---|---|---|---|
| | | Coefficient (se) | p |
| Longitudinal submodel | Fixed effects | | |
| | Intercept | 3.88 (0.11) | <0.001 |
| | Sex (male) | 0.24 (0.062) | <0.001 |
| | Age | -0.0052 (0.002) | 0.014 |
| | Time | -0.0015 (0.0018) | 0.400 |
| Survival submodel | Event of interest (D/HD) | | |
| | Sex (male) | 0.41 (0.33) | 0.209 |
| | Age | -0.012 (0.011) | 0.278 |
| | | | |
| | Association coefficient | -1.24 (0.49) | 0.011 |
| | | | |
| | Competing risk (TR) | | |
| | Sex | 0.51 (0.40) | 0.204 |
| | Age | -0.041 (0.012) | <0.001 |
| | | | |
| | Association coefficient | 0.54 (0.47) | 0.250 |

## ⌗ CONCLUSIONS

The use of statistical models that account for longitudinal and time-to-event outcomes in the presence of competing risks is a required tool to appropriately investigate dialysis outcomes. A decrease in albumin score is associated with an increase in the risk of death/transfer to haemodialysis. Older age was not significantly associated with lower combined survival in our peritoneal dialysis program.

## ⌗ REFERENCES

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