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WORKSHOP ON "ANALYSIS OF SURVIVAL AND EVENT HISTORY DATA"
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Monitoring progression towards end-stage renal failure

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The choice of approach to joint modelling of longitudinal and event history data can, and arguably should, be informed by the purpose of the modelling. At the risk of over-simplifying, a useful if broad distinction can be drawn between whether population-averaged or subject-specific effects are of primary scientific interest.

Progression towards end-stage renal failure is typified by an asymptomatic period that can extend over many years, but can be assessed indirectly by bio-chemical analysis of blood-samples. Also, early diagnosis and treatment can materially slow the rate of progression and so postpone the need for expensive and invasive renal replacement therapy (dialysis or transplantation). An important question is therefore : how can we use information that is easily obtained through routine blood-testing to provide early warning of end-stage renal failure ?

We shall describe a large data-set in which several thousand subjects in both primary and secondary care settings have had their renal function measured imperfectly, at irregular sequences of time-points. We develop a dynamic linear model for these data and use the model, in conjunction with a Kalman filter algorithm, to enable real-time updating of the predictive probability that an individual subject's underlying renal profile has crossed a clinically defined intervention threshold.

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