FUNCTIONAL DATA ANALYSIS OF HAEMOGLOBIN CONTROL IN DIALYSIS PATIENTS

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An application is presented that demonstrates the utility of several techniques in the field of functional data analysis. Data were analysed from a randomized controlled trial that compared two epoetin agents used for anemia correction in haemodialysis patients, prescribed through a computerized decision support system (CDSS), to a single Haemoglobin (Hb) goal. A total of 13 monthly Hb measurements were available for 77 and 74 patients respectively in the two arms of the trial. Fitting smoothed B-splines to these repeated measures provided useful functional representations, where graphical plotting informed the understanding of patient responses. Phase plots of the first versus second derivatives of the Hb trajectories identified those patients brought under control by the drug administration system and those in whom treatment supported by CDSS was less successful. Principal components analysis identified common features of the Hb trajectories that contributed to the assessment of the management system and the comparative performance of the two epoetin agents. Key aspects of feedback behaviour were also identified in this way. Functional comparison of the two treatment groups enabled assessment of the required dose conversion and provided a novel means to compare the overall effectiveness of the two agents when managed through the CDSS. Functional analysis identified the potential for tailoring dose scales to anticipated individual responses.