

NON-COMPLIANCE IN SURGICAL PATIENTS WITH HERNIATED LUMBAR DISCS: AN APPLICATION OF A LATENT CLASS MODEL AS SELECTION MODEL

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Lumbar disc herniation (LDH) is a pathology of the intervertebral discs which causes lower-back pain and/or leg pain (sciatica). Surgical intervention gives good results in a high percentage of cases, but does not cure the discal problem in its complexity. The best therapy for treating LDH is still controversial: in recent years the pendulum has swung toward non-operative treatment. A prospective observational study has been carried out on a sample of 135 LDH patients, from among those who in the year 2004 were treated at a medical Centre in Bologna (Italy) specialized in physiotherapy. Only some of the patients involved had previously been examined by a surgeon: one group had been recommended to undergo operative intervention but had not complied, whereas another group had been advised to resort to non-operative rehabilitation; a third group had not been examined by any surgeon and had been referred to the Centre directly by their general practitioner. The three groups of patients were compared at the end of the treatment; their state of health did not appear to differ significantly, after adjusting for covariates. The data thus seem to show that non-compliance with the recommendation of surgery did not in the end make the first group of patients worse-off than the others, although their clinical picture might have appeared more serious at the start.

However, the observed lack of effect may be induced by neglecting variables that measure unobserved features of the patients, such for instance as their degree of motivation in attending physiotherapy sessions. In order to investigate this effect, we fitted a latent class model, modified to allow for conditional associations between some of the observed variables. After labelling by the levels of a categorical variable Z the three groups of patients (surgical, non-surgical, not-evaluated-by-a-surgeon), we have defined a non-observable dichotomous variable U , which divides the patients according to whether they are highly versus moderately motivated towards the therapy, and have formulated a model in which, conditional on the covariates, the latent variable affects both the probability of belonging to one of the three groups of patients described above and the final outcome Y . We have assumed that the latent variable U may also affect an intermediate variable S , which expresses the patients' keenness towards the therapy, measured by either full attendance of the physiotherapy sessions or not.

Let x be the vector of covariates. The joint distribution of $(U,Z,S,Y|x)$ is modelled as a series of univariate distributions with:

- (i) a logit model for the distribution of $U|x$;
- (ii) a continuation logit model for the distribution of $Z|U,x$;
- (iii) an additive logit model for the distribution of $S|Z,U,x$;
- (iv) an additive global logit model for the distribution of $Y|S,Z,U,x$.

The results of this latent class model seem to suggest that, taking into account all the other observed characteristics, there is a significant difference in the probability of improvement between the two latent classes. Patients who are highly motivated in doing the physiotherapy have a higher probability of recovering, keeping constant all the other variables that indicate the severity of illness.