Calculating bronchiolitis severity using Ordinal Regression with a new command in Stata

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Definition

Clinical evidence of lower airway obstruction following a period of URI symptoms in a child less than 24 months.

Clinical Features of Bronchiolitis

- lower airway obstruction.

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- adventitial breath sounds.

Bronchiolitis Impact

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- Categorizing bronchiolitis severity is important for researchers who compare etiologies and interventions between patients.

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- Fewer still have been subjected to bootstrap validation, and we are aware of only one, the National Childrens Hospital severity of bronchiolitis model, (NCH-SOB) that has been prospectively validated at a different site from where it was derived.

Video

Please play video video0109.avi than video119.avi

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  - severe disease as greater than the median
- Validation dataset (Outpatient Data)
  - mild implied actual discharge from the ED
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  - mild implied actual discharge from the ED
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- This model was 91% sensitive and 83% specific in this subsequent validation cohort.

Ordinal Regression for NCH severity assessment tool

- The Logit function which is the total contribution of the independent variables is as follows:
  $Y_i = \sum_{k=1}^{K} \beta_k X_{ki} + \epsilon_i = Z_i + \epsilon_i$
- This equation can be further simplified by removing the random disturbance term, which, in this case, leaves the following equation: $Z_i = \sum_{k=1}^{K} \beta_k X_{ki}$
- At this point, the continuous latent variable, Zi, can be separated on the ordered scale by applying cut-points. This is done in the following manner if there are only 3 ordered outcomes:
  1. $P_{Y=1} = \frac{1}{1+e^{(Z_i-\kappa_1)}}$
  2. $P_{Y=2} = \frac{1}{1+e^{(Z_i-\kappa_2)}} - \frac{1}{1+e^{(Z_i-\kappa_1)}}$
  3. $P_{Y=3} = 1 - \frac{1}{1+e^{(Z_i-\kappa_2)}}$

Bronch and Bronchi syntax

Bronchiolitis Syntax

bronch varlist (max=4)[if] [, nch olhsc probability printscreen ageyear ageweeks agedays discharge admit by(name) generate(name)]

bronchi anything [if] [, nch olhsc ageyear ageweeks agedays]

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The **bronch** command expects data in the wide format i.e. one observation per row and all the required variables in that row.

Bronch and Bronchi Commands

bronch *varlist* calculates the probability of bronchiolitis severity for children who present to the emergency department according to NCH-SOB. The *varlist* consist of the following parameters:

- *work-of-breathing-term*
- *tachycardia/heart-rate-term*
- *age-in-months-term*
- *dehydration-term*

bronchi *varlist* provides an immediate version of the **bronch** command; however, **bronch**i does not contain all the options available in **bronch**.

Bronch and Bronchi Options

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- **ageyear** allows for an optional modification of the age parameter to permit ages in years.
- **ageweeks** allows for an optional modification of the age parameter to permit ages in weeks.

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- **by**(*name*) implements a bysort on the name parameter given to by() option.
- **generate**(*newvar*) generates a *newvar* variable that contains the bronchiolitis severity. The default is _bronch

Bronch and Bronchi Examples

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- **findit bronch**.

Questions ?