ENDGAMES

STATISTICAL QUESTION

Variables, sample estimates, and population parameters

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Researchers evaluated the effect of initial trophic feeding compared with full enteral feeding on physical function in patients with acute lung injury. A cluster randomised controlled trial study design was used. In total, 525 patients with acute lung injury admitted to hospital were recruited. Participants were randomised to low energy permissive underfeeding ("trophic feeding") or full energy enteral feeding ("full feeding") for up to six days; thereafter, all patients still receiving mechanical ventilation received full feeding.[1]

The primary outcome was blind assessment of the physical function domain of the SF-36 instrument, adjusted for age and sex, 12 months after acute lung injury. Secondary outcome measures included survival; physical, psychological, and cognitive functioning; quality of life; and employment status at six and 12 months. No significant difference was seen between initial trophic and full enteral feeding in mean SF-36 physical function at 12 months (55 (standard deviation 33) *v* 55 (31)). It was concluded that, in survivors of acute lung injury, there was no difference in physical function at 12 month follow-up after initial trophic or full enteral feeding.

Which of the following describe the mean SF-36 physical function scores at 12 month follow-up?

    a) Point estimates

    b) Population parameters

    c) Sample estimates

    d) Variables

Answers

The mean SF-36 physical function scores at 12 month follow-up are known as point estimates (answer *a*) or sample estimates (answer *c*).

The primary and secondary outcomes were measured for each trial participant. The outcome measures are variables (answer *d*). Variables are characteristics that differ from one trial participant to another. Other variables were also recorded for each sample member, such as their baseline characteristics, including age, sex, ethnicity, and body mass index.

It was not feasible to recruit to the trial the entire population of patients with acute lung injury admitted to hospital, so a sample was selected to estimate the population. The mean SF-36 physical function scores at 12 month follow-up for each treatment group are known as point estimates (answer *a*) or sample estimates (answer *c*). The sample mean scores estimate the population parameters (answer *b*)—the mean score that would be obtained for the population of all patients with acute lung injury admitted to hospital if they all received that treatment. Population parameters relate to the population—all patients with acute lung injury admitted to hospital—and not the attributes measured in the trial participants.

The values of the population parameters are unknown and therefore theoretical. The population parameters are in effect constant in value. It is essential that the sample means are good estimates of the population parameters. The sample becomes more representative of the population as the sample size increases. In turn, the sample estimates become more accurate because they become similar in value to the unknown population parameters. Any inaccuracy in the sample means as estimates of the population parameters will result from sampling error, quantified by the confidence interval. Sampling error and confidence intervals have been described in previous questions.[2][3]

Competing interests: None declared.

1   Needham DM, Dinglas VD, Bienvenu OJ, Colantuoni E, Wozniak AW, Rice TW, et al; for the NIH NHLBI ARDS Network. One year outcomes in patients with acute lung injury randomised to initial trophic or full enteral feeding: prospective follow-up of EDEN randomised trial. *BMJ* 2013;346:f1532.
2   Sedgwick P. What is sampling error? *BMJ* 2012;344:e4285.
3   Sedgwick P. Confidence intervals: predicting uncertainty. *BMJ* 2012;344:e3147.

Cite this as: *BMJ* 2013;346:f2019

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