

Pediatric EM Critical Appraisal: Outcome of Meningococcal Disease in Children

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Clinical bottom line: Three risk factors were associated with higher risk of death from meningococcal disease: failure to be looked after by a pediatrician, inadequate supervision of junior physicians, and failure of staff to administer adequate inotropes.

Citation: N Ninis, C Pjillirs, L Bailey, et al. The Role of healthcare delivery in the outcome of meningococcal disease in children: case-control study of fatal and non-fatal cases. *BMJ*. 2005 Jun 25;330(7506):1475.

MeSH Words: meningococcal disease, supervision, inotropes, morbidity, mortality

The study: Case control trial of children under 17 years who died from meningococcal disease. Each case was matched with three survivors (controls). Data was extracted from national statistics in the UK and hospital records. A panel of pediatricians blinded to the outcome reviewed records of cases and controls. They used predefined criteria for optimal management and rated where suboptimal treatment was given. 143 cases were matched with 355 controls. Departures from optimal management occurred more frequently in the fatal cases than in the survivors. Multivariate analysis identified three

independent risk factors associated with increased risk of death: failure to be looked after by a pediatrician, failure of sufficient supervision of junior physicians, and failure of staff to administer adequate inotropes. The odds ratio for death was 8.7 (95% confidence interval 2.3-33) with two failures, increasing with multiple failures.

Design: The study objective was to determine whether sub-optimal treatment accounts for poor outcome in patients with Meningococcal disease. A case control design is a reasonable approach to

try and answer such a question. The study is well designed but has several limitations.

Population and patient selection: The total number of cases included in this study is relatively high. However, in the control group

1/3 were excluded due to refusal of the parents to participate in the study and an additional 10% were excluded due to lack of information. In total, almost 50% of the control group was excluded. Although exclusion occurred before the matching, this may cause a potential bias. The matching did not consider the severity of the disease of the patient at admission or socioeconomic background. It is also worth mentioning that in 17 cases and 73 controls, the diagnosis of meningococcal disease was not confirmed by bacteriological studies.

Statistical analysis: The authors used multivariate analysis in order to identify risk factors for death. The severity of disease in each of the cases and controls was graded according to the Glasgow Meningococcal scaling. This scale was initially created as an indicator of severity to determine the most appropriate place for a child to be cared for. Other scores may perform better in predicting mortality (1). As mentioned above, matching was not based on disease severity. Therefore, the observed differences between cases and controls may still be partially related to disease severity; also, time interval between arrival to the hospital and the time of death was not mentioned. Therefore, the possibility of medical treatment to change the course of the disease in a child who died immediately after arrival may have been limited. That may also account for some of the observed differences between cases and controls (a potential bias). An important meaningful fact is that the panel that validated the treatment of the children was blinded to the outcome.

Results: Three independent risk factors were associated with increased odds ratio for death. The confidence intervals around these odds ratios are wide and therefore it is hard to determine the magnitude of the risk associated with each variable.

Conclusions: The results of this study suggest that better treatment improves survival. This

makes intuitive sense. Yet, one must remember that a case control study may only be helpful in finding an association.

"Our 2 cents": These results should once again encourage us to better educate and supervise trainees in the ED. This may be especially important in Israel where most patients in the ER are evaluated by residents.

Reference:

1. Castellanos-Ortega A, Delgado-Rodríguez M, Llorca J, et al A new prognostic scoring system for meningococcal septic shock in children. Comparison with three other scoring systems. Intensive Care Med 2002; 28(3):341-51.

Competing interests: Non declared

Funding: Non declared

This article has been peer reviewed

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