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IMPORTANCE OF AMMONIA LEVELS AND THE URGENT MANAGEMENT OF HYPERAMMONAEMIA IN THE DGH

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Background

North West & North Wales Paediatric Transport Service (NWTS) prioritise the safe transfer of critically ill children from District General Hospitals (DGH) to a Paediatric Intensive Care Unit (PICU). It is not uncommon for children with inborn errors of metabolism to present in extremis. Moderate to severe hyperammonaemia is life-threatening but can be corrected with urgent treatment and irreversible neurological sequelae is preventable.1,2 The turnaround time of serum ammonia samples is a time determining factor to initiate treatment.

Problem

This survey was carried out in response to a Level 4 incident involving a child where a delay in starting benzoate/butyrate may have contributed to his serum ammonia levels rising >1000µmol/L. Once the drugs were started serum ammonia levels rapidly reduced to 200µmol/L. The rise in serum ammonia levels could have been potentially preventable. An enquiry revealed that the incident was a result of a delay in turnaround time of processing the serum ammonia sample, a breakdown in communication between teams, and a further delay in obtaining metabolic drugs.

All 23 DGHs covered by NWTS were surveyed for their ammonia turnover times. Twenty DGHs processed ammonia samples in-house with a turnover time between 20 to 60 minutes. However, there could be up to a 3-hour delay if the analyser is undergoing maintenance at the time the sample is received. Two DGHs sent their samples away to a sister hospital to be analysed; 1 had the turnaround time of 1 hour while another had a turnaround time of up to 24 hours. Biochemistry departments of DGHs were also asked about the proper sampling techniques, transport, and analysis to ensure accurate and timely results.

Strategy for change

NWTS are supporting DGHs by negotiating to establish a pathway that enables serum ammonia results to be ready within one hour of obtaining the samples. We are also educating clinicians in DGHs through our outreach programs on the appropriate measures to take when collecting and sending off ammonia samples to avoid delays or obtaining spurious results.

Measure of improvement

This survey will be repeated 12 months from the initial survey. All DGHs must have a clear pathway to ensure that serum ammonia results are obtained within 1 hour of the sample reaching the laboratory. This is particularly vital in those that do not have in-house processing facilities. Turnaround times for all ammonia samples must be under 1 hour.

Lessons

Practice proper sampling techniques, transport, and analysis of serum ammonia, and exercise good communication between clinicians, pharmacy and the laboratories when treating hyperammonaemia.

Message

Recognise the importance and have a low threshold for checking ammonia levels and, when indicated, proceed to the urgent management of acute hyperammonaemia. Delays in sample processing can have severe, irreversible consequences.

References:

1. Fumio E, Toshinobu M, Kaede Y, et al. Clinical manifestations of inborn errors of the urea cycle and related metabolic disorders during childhood. J Nutr. 2004;134:1605-1609.

2. Saudubray J-M, Touati G, DeLonlay P. Liver transplantation in urea cycle disorders. Eur J Pediatr. 1999;158(2):55-59.