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The effectiveness of a program for neonatal hip screening over a period of 40 years: a follow up of the New Plymouth experience

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Summary of the deliberations

PICO statement

Patients

All babies born in the New Plymouth maternity unit New Zealand Between September 1964 to August 2004 formed the subjects for this study.

Intervention

All children were assessed by experienced Orthopaedic surgeons using a two step screening protocol of clinical examination consisting of Ortolani and Barlow test and range of movement. The children identified as unstable underwent the second step screening after six weeks and if still unstable were splinted with Von Rosen splint. All splinted children had radiographs taken at six months.

Comparison

A hypothetical control group was created by the authors by assuming the incidence for developmental dysplasia of the hip (DDH) to be 1.5 per thousand based on the data of two previous investigators (Mackenzie et al 1981 and Boeree et al 1994)

Outcome

Primary outcome assessed was the effect on late presentation of DDH at walking age. A secondary outcome was the number of those requiring additional treatment beyond splinting i.e., surgery

Results

Total number screened: 41,563

First step screening positive: 1639

Second step positive and assumed diseased: 633

Actual positive not known as no gold standard test applied

Seven were late presenters and thus failure of screening, these form the primary outcome. These were subdivided as

1. Four late presenters first step: false negative
2. Three missed by second step: false negative

Five others failed splintage and were failures of treatment and were really not relevant to screening success

Interpretation of the results

For us to evaluate any screening program, the following should be available:

- a. True incidence of DDH in the population being assessed using a gold standard
- b. Screening test positive (T+), negative (T-); Gold standard positive (G+), negative (G-)
 - i. True positive = T+G+
 - ii. True negative = T-G-
 - iii. False positive = T+G-
 - iv. False negative = T-G+

Based on these values we can calculate the sensitivity and specificity of the screening protocol. We are not able to do this for this study as no gold standard is used.

The incidence of neonatal instability varies from 1.7 to 21.8 per thousand live births and the incidence of late presenting DDH i.e., failure of screening varies from 0.07 to 2 per thousand with such wide variations in different populations and different studies the use of a gold standard is all the more important while evaluating a screening program when the true incidence in that population is not known. In a pilot study using ultrasound instability as a gold standard will make this data more meaningful.

We want any screening program to be very sensitive so as to minimise the number of false negatives. This carries the disadvantage of a large number of false positives who will also undergo treatment. An efficient screening program would be one with the smaller number needed to treat (NNT) to avoid one missed DDH.

Their presumed incidence of DDH requiring treatment without screening was 1.5 per thousand. By using this screening program their incidence of DDH requiring surgery had become 0.03%. The absolute risk reduction was 0.12%. Thus the number needed to treat to prevent one case of surgery will be 826.

The number splinted in this study is approximately 10 times the assumed incidence of DDH. The authors justify this unwarranted splintage by demonstrating the safety of the splintage used. Needless to say decreasing the number of children being splinted will be advantageous with respect to convenience of nursing and less emotional stress for the mother. In addition, indirect medical costs of transporting patients to the clinic, loss of wages for the caregiver, cost of consultation and utilisation of resources in terms of time and services of medical staff are difficult to quantify. Decreasing unnecessary splintage will be beneficial to the health care system and the family and is not as innocuous as it appears. Is it worthwhile will be the question that the health care provider has to answer?

We appreciate the meticulous data collection and the painstaking analysis. This data has given us insight into planning a similar clinical screening study. The steps we would use are:

- 1) A pilot study to assess the sample size for assessing true DDH incidence using a gold standard.
- 2) Incorporate ultrasound in the second step to avoid unwarranted splintage for those who test positive by step 1 or 2
- 3) It would be very important to incorporate an economic analysis to evaluate cost effectiveness of the screening program especially if our true incidence is found to be very low.
- 4) We would calculate specificity, sensitivity and NNT of the screening program.

We would like to commend the authors on their valuable contributions to our understanding of the subject. The simplicity and usefulness of a good clinical examination warrants its incorporation into any screening program. However, addition of a modality that would decrease the number of patients splinted would be resource effective.