Pain may have a negative impact on the outcomes of childhood vaccinations, but this can be minimised by selecting an appropriate needle size.

Selecting a needle size for childhood vaccinations

In this article...

- Effect of needle size on vaccination outcomes
- Implications of a Cochrane review on needle size

The average child who adheres to recommended immunisation schedules receives at least 18 injections before the age of 16 years. Evidence suggests that pain may have a negative impact on vaccination outcomes by reducing immunity and long-term healthy behaviours, such as adherence to immunisation schedules and future medical procedures.

Nurses can minimise pain, and thus increase vaccine efficacy, through careful selection of the needle. This Cochrane review (Beirne et al, 2015) aimed to assess the effects of using needles of different lengths and gauges, when administering vaccines to children and adolescents, on the vaccine’s ability to elicit an immune response, procedural pain, and other adverse events following administration.

Intervention

The review included trials to evaluate the effects of hypodermic needles of any gauge or length used to administer any injectable vaccine to children and adolescents. The vaccine could be administered via intramuscular, subcutaneous or intradermal routes in hospital or community settings.

Results

The review included five randomised controlled trials with a total of 1,350 participants. The evidence from two of the trials was insufficient to allow any confident statements to be made about the main outcomes of interest, namely, post-vaccination incidence of vaccine-preventable diseases, pain, and crying measures. The remaining three involved 1,135 infants, mainly aged 2-6 months, who were undergoing intramuscular vaccination procedures with combination vaccines containing diphtheria, tetanus and pertussis (DTwP) antigens, with or without other vaccine antigen components.

The vaccines were administered to healthy infants using the World Health Organization injection technique: skin stretched flat, needle inserted at a 90-degree angle and up to the needle hub. As before, it was difficult to draw firm conclusions from these trials. There were weaknesses in trial designs, such as incomplete blinding methods and imprecise outcome measures. However, the review does conclude that severe and non-severe local reactions probably occur less frequently when 25mm (either 23G or 25G) needles are used to administer DTwP combination vaccines to infants, rather than 25G 16mm needles.

Only one trial evaluated the effect of needle gauge on vaccination-related procedural pain and procedural crying. Using a wider gauge needle (23G 25mm), compared with a narrower gauge, may slightly reduce procedural pain and probably leads to a slight reduction in the duration of crying time immediately after vaccination.

Conclusion

The review authors have highlighted the limitations of the results of the review. This not only includes the paucity of evidence available but also the specific settings to which conclusions apply in terms of the age range of applicable patients, technique used to administer vaccines (only skin stretching was used in the trials), and the type of vaccinations administered. Significantly, none of the review findings are supported by high-quality evidence.

The authors also comment that the findings are most likely to be relevant in developing countries where DTwP vaccines are mainly used. These vaccines cause more local and systemic reactions than vaccines with an acellular pertussis (aP) component that are used in most developed countries. With this in mind, it cannot be assumed that similar results to those reported in this review would be observed where aP vaccines are predominantly used.

Implications for practice

This review clearly highlights that further trials need to be conducted, initially using vaccines that are part of routine immunisation schedules. On a practical level, there are multiple questions to which nurses still need evidence-based answers, for example, on the effects of using needles of different sizes for vaccination procedures in patients who are obese. However, the UK Department of Health’s recommendation of 25mm needles for intramuscular injections for infants under 12 months, as listed above, is supported in this review.

Anne Wareing is clinical nurse specialist, Department of Haemostasis, St George’s University Hospitals Foundation Trust, London, and a member of the Cochrane Nursing Care Field

Reference