of caesarean section and adverse outcomes associated with the spontaneous onset of labour in women with a malpresentation. Consequently, opportunities to prevent caesarean delivery—and various related adverse birth outcomes—are being missed.

A better way to diagnose fetal malpresentation would be to perform an ultrasound examination routinely at 35-36 weeks' gestation on every pregnant woman. However, as noted by the authors, the cost and resource implications of this approach would need to be considered. Further, it is important to consider two factors that were not a part of this study: the skill of the clinician and the confidence they have in their examination. Common sense suggests that an experienced clinician who is confident in their examination would be more likely to determine fetal lie correctly than a less experienced and confident clinician. However, variable accuracy in this task has been documented even among experienced clinicians.⁵

US family physicians who attend deliveries care for 20-60 prenatal patients a year, and obstetricians care for 80-150. If persistent breech presentation occurs at a rate of 3-4%,⁶ then an average family physician's practice will contain a late third trimester malpresentation 0-3 times a year and an average obstetric specialist's practice will contain a malpresentation 2-6 times a year. If the findings of Nassar and colleagues' study are applied, and failure to diagnose non-cephalic presentation correctly at 36 weeks' gestation occurs 33% of the time, then a non-cephalic presentation will be missed by a family physician once every two years and by an obstetrician once or twice a year.

This may not seem to be common enough to prompt a change in clinicians' behaviour. However, other tests are routinely used to guide the diagnosis and treatment of relatively rare but important conditions, such as gestational diabetes, group B *Streptococcus* colonisation, and HIV infection. Because fetal malpresentation can often be successfully managed with either external cephalic version or elective caesarean section, diagnosis and treatment of non-cephalic presentation just before term should be included in the list of possible important prenatal screening activities.

The findings of Nassar and colleagues may not be strong enough to support a call for routine ultrasound

examination of all pregnant women at 35-36 weeks' gestation, but the study should remind all clinicians to assess fetal lie routinely at 36 weeks' gestation. If a clinician is well trained, is confident that a fetus has a vertex presentation, and has a good track record of correctly identifying malpresentation, then ultrasound screening is probably unnecessary. If a clinician is relatively inexperienced, is unsure of their examination, or has a history of missing the presence of a fetal malpresentation, then ultrasonography is probably indicated. The findings also showed that patient factors, such as maternal obesity, might increase reliance on ultrasound examination to determine fetal lie.

Despite the known risks of external cephalic version, birth outcomes clearly could be improved if all women were accurately screened for malpresentation before the onset of labour.^{7,8} The increased use of ultrasound examination to determine fetal lie, at least in questionable situations, would increase the accuracy of such screening.

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Size of the needle for infant vaccination

Longer needles reduce incidence of local reactions

Research p 571

Vaccine safety is a contentious issue, and parental concern continues.¹ An online survey (Harris Poll) in 2004 showed that half of parents are concerned that a child might develop a long term medical condition as a result of vaccination, and 10% are "uncomfortable" having their child vaccinated owing to "health reasons."² These parental concerns may be fuelled by the increasing number of websites making serious allegations about vaccine safety.³

Independent bodies—for example, the US Institute of Medicine—have reviewed the evidence for several vaccines and have generally found them to be safe,

albeit with rare risks such as anaphylaxis.⁴ However, local reactions to vaccines are common—ranging from 6% to 50%, depending on the vaccine, definition of local reaction, and dose number in a series—and this can contribute to the safety concerns expressed by parents. Local reactions can be reduced either by using less reactogenic vaccines, such as acellular pertussis vaccines, or using less reactogenic administration routes.

In this issue of the *BMJ* a randomised controlled trial by Diggle and colleagues compares the effect of vaccinating infants with needles of varying length and gauge.⁵ They found significantly fewer local reactions

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with longer (25 mm) versus shorter (16 mm) needles, with reductions of 22%-54% at days 1, 2, and 3 after a combined diphtheria, pertussis, tetanus, and *Haemophilus influenzae* type b vaccine.⁵ The number of infants needed to vaccinate with a longer needle to prevent a local reaction varied from six to eight, depending on dosage. Similar rates of reactions occurred between same length needles of differing widths for the vaccine, and similar rates of reactions occurred for varying widths and lengths for meningococcal conjugate serogroup C vaccine. Immune responses were similar for different needle lengths and widths, although immunogenicity to pertussis antigens was not assessed. The authors conclude that a 25 gauge, 25 mm needle should be used for infant immunisation.

The benefit of using longer needles is supported by other data. A study of a combined diphtheria, pertussis, tetanus, inactivated polio *H influenzae* type b vaccine at age 18 months compared both site (thigh versus deltoid) and length of needles in the thigh.⁶ Redness and swelling were more common with the 16 mm than the 25 mm needle. A study of diphtheria and tetanus vaccine in adolescents found lower rates and duration of local reactions (redness, swelling, itching, and pain) with intramuscular versus subcutaneous injection.⁷ In a study of fat pad thickness at the deltoid in adults, a 16 mm needle would not have reached 5 mm into muscle in 17% of men and 48% of women.⁸ A trial of meningococcal polysaccharide vaccine in adults found reduced redness and headaches with intramuscular compared with subcutaneous administration.⁹

Authorities at the Centers for Disease Control and Prevention and the American Academy of Pediatrics recommend that vaccines containing an adjuvant (such as *H influenzae* type b) should be injected into muscle because administration subcutaneously can cause local irritation, induration, discoloration, and granulomas.^{10 11} Subcutaneous injections can also cause abscesses and decrease the efficacy of hepatitis B and other vaccines.¹² Thus, for intramuscular injections the needle should be long enough to reach the muscle and to prevent vaccine from seeping into subcutaneous tissue, but not so long as to injure underlying nerves, blood vessels, or periostium.

In most infants the anterolateral thigh has a substantial muscle mass and is therefore the recommended site for injection.^{10 11} If the subcutaneous and muscle tissue are bunched to minimise the chance of striking bone, as some have recommended,¹³ then a 25 mm needle is required to ensure intramuscular administration in infants. For older people, an

individual decision on needle size and site of injection may be based on the size of the muscle, the thickness of subcutaneous tissue, the injection technique, and the volume of the material to be administered. For toddlers and older children, the deltoid muscle generally should be used with a needle from 16 mm to 25 mm if the muscle mass is adequate; the anterolateral thigh can be also used, but the needle should be at least 25 mm in length.¹¹

Current evidence supports stopping the use of short needles for intramuscular injections in the thigh of infants, and using longer (25 mm) needles. This should reduce the incidence of local reactions and help to allay parental fears about potential adverse effects of vaccines.

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