

familiar with the manufacturer's directions for storage and reconstitution of the vaccine. For example, if the vaccine is to be refrigerated, it should be stored on a center shelf, not in the door, where frequent temperature increases from opening the refrigerator can alter the vaccine's potency. For protection against light, the vial can be wrapped in aluminum foil. Periodic checks are established to ensure that no vaccine is used after its expiration date.

The DTP (or DTaP) vaccines contain an adjuvant to retain the antigen at the injection site and prolong the stimulatory effect. Because subcutaneous or intracutaneous injection of the adjuvant can cause local irritation, inflammation, or abscess formation, excellent intramuscular injection technique must be used.

The total series requires several injections, and every attempt is made to rotate the sites and administer the injections as painlessly as possible. (See the discussion about intramuscular injections in [Chapter 20](#).) When two or more injections are given at separate sites, the order of injections is arbitrary. Some practitioners suggest injecting the less painful one first. Some believe this is DTP (or DTaP), whereas others suggest the MMR or Hib vaccine. Still others advocate injecting at two sites simultaneously (requires two operators) (see [Research Focus](#) box).

Research Focus

Order of Injections

[Ipp, Parkin, Lear, and colleagues \(2009\)](#) evaluated the administration order of the vaccines diphtheria, tetanus, and acellular pertussis–*Haemophilus influenzae* type b (DTaP-Hib) and pneumococcal conjugate vaccine (PCV) and pain perception in 120 infants 2 to 6 months old. The infants who were given the primary DTaP-Hib vaccine before the PCV vaccine had significantly lower pain scores as measured by the Modified Behavioral Pain Scale than those who received the PCV vaccine first. Both groups of infants were given both vaccines. Additional pain measures included crying as measured by video recording and parent perception of child pain using the visual analog scale. The researchers recommend giving the primary DTaP-Hib vaccine before the PCV to reduce pain in infants receiving routine