

Commentary

A tricky business:

Blunting the pain of childhood immunizations

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Finding a single, simple and uniformly effective way to reduce immunization discomfort in children continues to elude most clinicians as well as laboratory investigators. The magnitude of the problem can be inferred by contemplating the impact of the approximately 20 separate needle sticks recommended by the American Academy of Pediatrics and given during the first 5 years of life (Taddio et al., 2009). There exists a well-documented anxiety-generating conditioned effect of painful medical experiences in childhood, beginning with those inflicted during the newborn period and continuing thereafter (Woodin et al., 1995; Taddio et al., 1997a; Cohen et al., 2001; Schechter et al., 2003; von Baeyer et al., 2004; McMurtry, 2007; Kuttner, 2010). The currently recommended pediatric immunization schedule, engendered by the development of new effective vaccines, further reinforces a sad reality of recurring physical insult in the doctor's office over a period of several years. Such a pattern may well result in fear of medical things and medical people, sometimes extending through childhood and into adulthood (Nir et al., 2003).

Do potential solutions to the problem reside in altering the circumstances surrounding injections, reduction of anticipatory anxiety, development of an effective and deeply penetrating topical anesthetic, or all of the above? Each of these potential factors has been addressed: Schechter et al. (2007) analyzed existing data and published evidence-based guidelines to promote the best circumstances, practices and parental attitudes to

minimize injection pain. Chambers et al. (2009) and Uman et al. (2006) offered analyses outlining the benefits and limitations of distraction, hypnosis and other psychological interventions. Topical anesthetics have been shown to be useful by Taddio et al. (1997b), Reis et al. (1998), Halperin et al. (2000) and others. However, some of the topical agents require advance planning and occlusive coverings; they are variably effective and their use does not directly address the anxious foreboding associated with injections. Simple volitional distraction techniques such as blowing bubbles can reduce discomfort in children who willingly engage in them at the time of needle insertion (Sugarman, 1996). A recently described, carefully scripted multimodal hypnosis-based distraction approach encouraging dissociation from the shot has recently been shown to be highly effective in a randomized study of 4- to 6-year-old children (Berberich & Landman, 2009). However, in some clinical settings, the modest additional time and personnel required may discourage its utilization. In addition, the same level of efficacy could not be demonstrated for two of the components when evaluated separately and without accompanying verbal suggestions of diminished sensation (Cobb & Cohen, 2009; Cohen et al., 2009).

In a February 2010 article in the widely read pediatric journal *Pediatrics*, Wallace et al. offer yet another distraction modality: They describe a "cough trick" based on a method employed by Usichenko et al. (2004) in adults receiving venipuncture. The cough trick consists of a

preparatory warm up cough of moderate force, and a similar follow-up cough coinciding with needle puncture of the skin. This method theoretically has the advantage of being portable, quick, inexpensive and conserving of medical personnel. Such a quick fix intervention could be enormously appealing and uncritically grasped by busy, beleaguered pediatricians. However, the study does have a number of significant limitations that call its results into question. Some of these are enumerated by the authors themselves: As almost half of the eligible children refused to participate in the study, the residual group may have been biased towards success. In addition, study participants who refused to cough should have been considered failures of the method rather than excluded from evaluation. The study included an admixture of two widely separated, developmentally distinct age groups, namely ages 4-5 years and 11-13 years. The child satisfaction questionnaire was filled out incompletely, because younger children seemed too distressed to respond, suggesting relatively less efficacy in that age group. Wallace et al. (2010) do not discuss the question of arm movement during the cough, an issue raised in response to the Usichenko et al. paper (Sinha & Manikandan, 2004; Usichenko & Pavlovic, 2004).

Of further concern is the cough trick moniker, which could be interpreted as a diversion undertaken without the foreknowledge of the recipient. A "trick" may generate more distress rather than less if the child is taken by surprise; it might help the first time but not again if it works by deception. However, the cough trick method has the potential of inviting the acquiescence and participation of the child, provided he or she knows the full extent of what will happen. Children may be recruited in advance and join the beneficial intervention rather than having it imposed as a surprise.

The paper by Wallace et al. (2010) underscores some of the challenges and complexities faced when designing a rigorous and robust protocol involving live subjects recruited in the course of routine medical care. A prospective randomized controlled study of immunization pain is most convincing when it addresses technical variables, evaluates uniform vaccines and their

sequencing, is restricted to a developmentally comparable age group, and provides both objective and subjective outcome measurements. Even when the design is rigorous and the outcome significant, practical obstacles to widespread implementation nevertheless loom. Individual differences among private practice settings, clinics and teaching institutions may call for minor modifications of published protocols. Yet the adaptive alteration of even a single key element in a study could render the whole unsupported by evidence or in need of a new study to be legitimized as evidence based.

Further frustrating the search for a single approach to reducing immunization pain is the significant overlay of anticipatory anxiety. Generalized anxiety and specific needle phobia reflect the individual child's experience and perception of immunization discomfort. Conditioned over time, the level of anxiety is typically amplified well beyond what an adult observer might anticipate for a less-than-five-second injection. Psychotherapeutic interventions to reduce anxiety tend to be crafted and modified to best suit the individual at hand, thus not readily conducive to a one-size fits all approach. Anxiety-reducing interventions can be difficult to assess rigorously once there is individualization, as this may muddy a strict prospective randomization model.

Will a quickly-applied, comfortable and deeply-penetrating topical anesthetic given consistently beginning with the very first injection erase the fear associated with immunizations? Would anxiety and fear exist even in the absence of physical injection pain? Is the very fact of a needle sufficient to produce apprehension, even if the arm is numb? Would the absence of a needle eliminate fear of immunization? Until those questions can be answered definitively, it seems our best bet is to use all evidence-based measures that reduce nociception, including words and sensations to promote dissociation from the injection (Berberich & Landman, 2009). Thus approached, many a child may surprise us by supplying his own "magic bullet." In the words of the Irish poet, James Stephens: "Curiosity will conquer fear even more than bravery will."

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