

A Look at Pediatric Pain Management and the Father of Academic Anesthesia, Ralph M. Waters, MD

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Ralph M. Waters MD is considered the founding father of academic anesthesia. We recently came across an article from 1938 where he turns his attention to analgesia for children. To our knowledge, this is the only time he focused his academic prowess on pediatrics. In his article from the American Journal of Surgery, Waters outlined the five most common influences affecting children's perception of pain and response to analgesics. This list, surprisingly, views the patient in a holistic light by considering atmosphere and state of mind. More striking was his conclusion of tailoring the analgesia and sedation to the particular child, thus debunking the 'one size fits all' style of pediatric anesthesia during that time.

Waters defined pain suppression as dependent upon the "depression of the excitability of the cell protoplasm in portions of the CNS." As excitability of nervous tissue increased the susceptibility to drug depression decreased. Waters suggested that the most important factor influencing excitability is age. A colleague, Guedel, plotted metabolic activity versus age and suggested that there is a parallelism between metabolic activity and cell excitability. Thus, from birth to puberty, this cell excitability is in a state of rapid but inconsistent flux. Waters attributed these rapid changes early in life to rate of growth and beginning endocrine activity. He applied this clinically to the assessment of pain by stressing the importance of constructing an imaginary curve for each child that we aim to treat. This curve of metabolic activity or cell excitability is raised or lowered by factors influencing the patient's need of pain relief. The five most common factors according to Waters were:

- a. Strength
- b. Temperature
- c. Emotional state
- d. Bodily comfort
- e. Endocrine activity

Waters stated, "if an approximation to basal metabolic activity and cell irritability could be secured in every child before entrance to the operating suite, the choice of agent and technique of administration to produce anesthesia would be simple."

Waters emphasized that "the physician should never lose sight of the fact that non-medical treatment, such as a comfortable bed, hygienic atmosphere free from carbon dioxide and with ample oxygen, elimination of mental irritation, etc., decreases the need for sedation with this group of drugs." He urged a more modern technique of titrating subsequent doses of sedatives/analgesics to the individual child's responses to the previous dose. "Careful individualization of the choice of drugs as well as doses will develop in the physician a skill far more satisfactory than any attempt at routinization (sic)."

In conclusion, Waters postulated that dosing of a depressant drug in children should be based upon a parallel curve for cell irritability and metabolic activity rather than solely upon age and weight. He detailed five factors that elevate or depress the curve and must be considered in determining a child's cell irritability. Waters' holistic approach, unusual for the 1930's, taught anesthesiologists to tailor treatment to each child.

References: Waters, RM, American Journal of Surgery, 1938