

Pain Care of Severely Neurally-Compromised Patients

Practical and Ethical Considerations

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Over the past two decades, the issue of pain in obtunded and vegetative patients has attracted considerable attention and has become the focus of ongoing debate in light of both several “high profile cases”^{1,2} and an increasing capacity for neurotechnology to afford insight and perhaps access into the “brain and mind” of such patients.³ In this latter regard, neurotechnology has enabled an enhanced understanding of the relationship of brain structure to consciousness and this knowledge has instigated pragmatic and ethical concerns about the capacity of severely neurally-compromised patients (SNCPs) to experience pain. Yet there remains some contention as to whether or not pain actually is experienced in patients with severe neural compromise.⁴ We argue that any approach to this issue must account for (1) the neuroanatomy of pain, (2) the viability of certain neuroanatomical substrates following particular types and extent of brain injury, (3) the potential for reorganization/re-modeling of the injured brain, (4) the capacity of the injured and compromised brain to sustain some form of pain sensation and/or perception, and (5) the phenomenal nature and extent to which such stimulation might affect the person in whom that brain exists.

In this essay, we pose a fundamental question—namely, what extent of cerebral compromise will obviate the sensation and perception of pain as a noxious event? Thus, while cortical function—considered to represent the requisite neuroanatomical substrate(s) for consciousness, if not identity—may be compromised or absent, can we be certain that pain (in some form that retains the qualities of noxiousness) is not processed by sub-cortical structures to an extent that is subjectively experienced? While a loss of reticulo-thalamic activity certainly might be viewed as sufficient to qualify determination that a patient might not be able to process intero- and/or exteroceptive afferent information,⁵ the clinical picture is less clear given compromise to other central neural substrates. Simply, we do not know

“how much” brain is required to evoke and sustain some semblance of self and we cannot be certain whether pain, in some form that is subjectively noxious, is “felt” by the SNCP—particularly in light of such patients’ inability for efferent reactions and/or expression.

This issue prompts renewed address in light of progressive knowledge of the function of the nervous system; the interaction of brain, mind and pain; potential influence of neurotechnology on limitations of clinical decision-making; and the ethical questions that these factors generate. A growing body of empirical evidence fortifies appreciation that pain sensation and perception can, and likely does, occur in such patients—particularly during the period after initial neural insult—and that this pain warrants clinical consideration especially during the conduct of invasive procedures.^{6,7}

Despite the hundred-year history of anesthesia as a staple measure in almost every invasive medical intervention,⁸ the provision of anesthesia and/or analgesia to SNCPs during invasive procedures long remained unconsidered based upon the longstanding belief that the compromised brain was insensate to pain. However, this position is becoming increasingly contested, in light of studies that suggest that the neural pathways for pain are not simply cortical but may involve sub-cortical structures that may remain relatively intact and viable after trauma.⁹ Hence, we opine that there is a need to at least address, if not precautionarily treat, pain in SNCPs.

The neural systems that subserve pain appear to be differentially plastic throughout the lifespan.¹⁰⁻¹⁸ However, it is still not fully known how such pain systems react to global neural insult. Thus, despite inactivity of cortical structures following trauma, the reticular-midbrain, hypothalamic-pituitary, and thalamo-limbic pathways may remain viable. Questions remain as to whether each and/or all of these systems, networks and pathways need to be fully functional for the pain experience to occur and whether the experience of “pain” in SNCPs is equally or equivalently noxious to that in the un-compromised patient.

Given the definition of “pain” as “...an unpleasant sensory

and emotional experience...¹⁹ then for a subjective phenomenon of noxious sensation to be “experienced” as “pain” it would necessarily involve the substrates and have some combinatory qualities of sensation, cognition and emotion.²⁰ Chugani et al have posited that if specific areas of the cortex that are responsible for the associative aspects of linking sensation to cognition and emotion are not fully functional,²¹ then the organism cannot “experience” pain qua pain.

However, the “experience” of pain, while involving a number of higher neuroanatomical areas (e.g., the somatosensory and associative cortices), is reliant upon subcortical structures as well. Furthermore, these structures likely do not function site-specifically, but are engaged as, and within, a network. The properties of network contribute to mental process(es) which may vary in each individual and may be “re-directed” and re-modeled as a consequence of pathologic insult. Thus, arguments that attempt to negate the possibility of SNCs’ pain may be flawed in that they tend to attribute the function of the whole brain to particular parts (i.e., the mereological fallacy).²² Additionally, it is erroneous to assume that pain is uniform across individuals and “knowable” only in terms of its meaning and the capacities used to express it. Both the sensation and experience of “pain” are subjective and individually variant. We cannot “know” what the feeling(s) of pain are like for another person. Rather, we can only comprehend the expression and/or explanation of their experience.^{23,24,25} The lack of expressive capability does not refute the possibility that other individuals can have pain. Clearly the example of those with “locked-in syndrome” demonstrates this. Given that the existential reality of “being obtunded” or “vegetative” cannot be subjectively explained, a frame of reference does not exist for these conditions. Therefore, we must rely upon our understanding of the nervous system, as well as our interpretations of neurophysiologic data and behavioral responses to develop a contemporary hermeneutics that allows some appreciation of such experience. Since we do not concretely “know” if SNCs feel some sort of “pain,” it is important to consider whether the neural substrates that remain functional could mediate noxiousness. If so, then this would support the provision of analgesia to SNCs—at least during invasive medical procedures.

Pain and pain-modulation in the intact organism are complex processes of spatial and temporal interactions within, and between, anatomical and neurochemical systems that function as multi-directional, hierarchical, networks.²⁶ Neuronal- and neural-glia networks all respond differently to various pathologic insult. Similarly, metabolic systems responsible for the biosynthesis of neurotransmitters and neuromodulatory agents—as well as the pre- and post-synaptic receptors that mediate anti-nociceptive effects—do not respond uniformly.²⁷ Perhaps most importantly, it must be borne to mind that phenotypic expression occurs as a consequence of environmental exposure and experience.²⁸ So it could be that pathologic insult induces a re-modeling of pain networks to remain viable to some extent.

In light of this, we pose four questions as critical to any discussion of pain in SNCs and whether it should be treated: First, could the pathologic disturbance or invasive procedure negatively affect the function of the pain and pain modulatory systems so as to produce significant (predisposition or occurrence of) pain? Second, if we advance this line of thought, then

we are compelled to question whether we may need to reduce pain incurred by the pathology and/or its treatment. This prompts the third question of how to assess pain in SNCs and, finally, how, and to what extent, should such pain be treated. While answers to the first and second question proceed from an objective focus upon pathology and its effects, any account that acknowledges pain must also address the inherent problem associated with both assessing such pain and using this (and other) information as necessary to develop concrete protocols and paradigms for pain therapeutics.²⁹

As previously discussed, at very best we must employ neurophysiologic data, together with a working construct of the relationship of the brain-mind to the experience of pain, to form a rational grounding for evaluating the potential for pain in SNCs. Given contemporary knowledge of neural function—and its implications for the nature of brain, mind and self—it would seem that we are pragmatically and morally compelled to at least consider providing some regard for the clinical care of pain and suffering in SNCs.

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Ultimately, any patient in clinical care has practical and moral worth and is the subject of regard and responsibility. We acknowledge, however, that situations occur that force circumstantial discriminations in the type and level of care that is provided to the SNC. How can such clinical decisions be made? Clearly, the needs for pain care differ in each patient, and these differences must be accounted for by the facts and impressions that underlie any reflection upon the circumstances, intentions, actions and consequences that contribute to clinical decision-making.

Obviously, no single dimension of knowledge or decisional skill will provide universal answers or abilities. Maintaining thorough, up-to-date knowledge of the structure and function of the neural systems that mediate pain and analgesia is vital. Nevertheless, we opine that it is equally important to recognize how and why this objective information contributes to, and “fits” into, a contextual understanding of: (1) how these systems create first-person experience(s) and, this being the case, (2) how pain medicine must deal with the uncertainty of applying objective fact(s) to the realities of others’ subjective experience. In actuality, medicine remains a science of probabilities³⁰ and its humanistic domains are executed as a hermeneutic exercise.³¹ As such, just as any single dimension of knowledge cannot completely serve these functions,³² we have argued elsewhere and re-claim here that the use of a single ethical approach is equally constraining.³³⁻³⁶

We have posited that there are certain “rules” that define the profession of pain medicine and these are built upon and shaped by the facts of pain, realities of pain care, and the practical and moral claims that arise from this intersection.^{37,38} But such “rules” cannot, and do not, provide the answers for each and every

dilemma in all situations. At this particular point in time, the specifics of whether and how to provide pain care to SNCPs must be addressed and decided upon using a case-by-case method. However, to re-iterate our previous work, irrespective of the rules that shape the profession and/or the utility of the casuistic approach, the final decisional process relies upon, and underscores, the therapeutic and moral agency of the individual physician as steward of knowledge to uphold the medical fiduciary. We have argued the importance of prudence (i.e., phronesis, practical wisdom) as the cardinal, fulcrum virtue that allows the use of diverse types of knowledge to inform and direct morally sound action(s).

At least in part, the knowledge that contributes to such prudence (i.e., the factual basis of what pain is) and the capabilities of pain medicine are dependent upon, and reflect, advances in research.^{39,40} Research findings contribute to not only the scientific aspects of pain medicine, but must compel and sustain advances in medical education, guidelines, and the ethical and

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policy frameworks that shape clinical practice. To be sure, there are no “easy answers” to the questions we have raised relevant to the care and treatment of pain in SNCPs. As scientific knowledge and technology advance, the capabilities of what can be done make ardent strides and it becomes increasingly apparent that the true goal of research is to enable prudence so as to provide insight into how such advances should be utilized to fulfill the humanitarian purpose of medicine. ■

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