Behavioural science and chronic pain

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Introduction

Viewing chronic pain from the perspective of behavioural science requires consideration first of conceptual models. We develop theories or conceptual models to assist in ordering observations into more coherent patterns. We sometimes fail, however, to distinguish between models or theories and statements of fact. Observations viewed from the perspective of a given model may lead us to one set of conclusions. The same observations, viewed from a different conceptual model may lead us to quite different conclusions. The observations may be facts but the conclusions are not.

The disease model perspective

Traditionally pain has been viewed from the perspective of a disease model (Fordyce, 1976). The essential feature of that model to this discussion is that it assumes the indicators of pain—the symptoms of the patient—are a result of some process lying within the person. That process is properly understood to involve the complex interplay of a number of factors. It is not necessary here to reiterate the full topography of pain stimulus-nervous system transmission and processing-organism response. It should suffice to note that without the capacity to respond to a stimulus peripheral to the central nervous system, somehow to process it, and to transmit some form of response, there would be no pain problem.

The diagnostician, on identifying the presence of symptoms from the patient indicating a pain problem, seeks the 'cause' of the symptoms and then takes action designed to eliminate or minimize that 'cause'.

The diagnostic work-up may fail to identify a physical source of nociception. Assuming the problem is not one of the so-called central pain states (e.g. deafferentation syndrome, trigeminal neuralgia) (Loeser and Fordyce, 1983), a common alternative hypothesis is to consider that the symptoms of pain are a result of some other process lying within the person. The 'cause' is likely to be assigned to the

mind. The terms used are usually some variant of psychogenic or psychosomatic. More specifically, the pain problem may be identified as a conversion reaction or hysteria, as hypochondriasis, as a personality or motivational problem, or perhaps as malingering. Other terms may be used. They have in common the inference that the symptoms of pain are occurring as a consequence of some mental process.

The disease model view of pain, by inferring there is peripheral nociception (i.e., physical findings) or a psychogenic problem, can be seen as a closed system. It assumes the salient events reside mainly within the person.

The disease model perspective of pain is useful. It is probably a correct or valid conceptual tool for most recent-onset pain. It is, however, a conceptual model and not a statement of facts. There are alternatives. One such alternative is rooted in behavioural science. The intent of this paper is to set forth briefly a basis for viewing clinical pain in terms derived from behavioural science. Clinical pain, when seen from the perspective of a behavioural or learning/conditioning model, may lead to quite different inferences from those derived from a disease model. Those differences are often critically important to understanding, diagnosing, and managing problems of clinical pain.

The behavioural perspective

It is necessary first to recognize that pain problems are signalled by the behaviour of the patient. Without visible or audible indications from the suffering person that there is a pain problem, in the practical case, there is no pain problem. Observing an athlete in a physical contact sport sustain a severe blow leads us to conclude he/she is experiencing nociception. However, if that athlete proceeds without significant change in behaviour, one can hardly conclude there is a pain problem. There may have been nociception and, presumably, the sensation of pain, but there is no pain problem. To make this point another way, a patient coming to a physician and stating 'I feel fine.

There is nothing wrong. I have no pain' and displaying no other forms of behaviour suggesting to the observer there may be a pain problem can hardly be considered to have a pain problem.

Behaviours of patients which indicate presence of a pain problem are pain behaviours. To complete the circle, pain behaviours *are* behaviour. The significance of that is that pain behaviours, as behaviour, are subject to influence by whatever factors influence behaviour.

Much is known about what influences behaviour. To understand the major factors one must first distinguish two sets of behaviour of which people are capable: respondents and operants (Turk and Genest, 1979). Respondents involve autonomically mediated responses; e.g., glandular and smooth muscle functions. They are termed 'respondents' because they respond to stimuli. An adequate stimulus in the intact organism produces the response. Respondents thus are reflexive in nature. Operants are actions involving striated or voluntary musculature. They may be elicited by an antecedent stimulus, as when one withdraws a hand from a hot stove. Operants, however, have the critically important characteristic of being sensitive to learning or conditioning effects from contingent reinforcement. They are called operants because they operate on or influence the environment by leading to or eliciting potentially reinforcing or aversive consequences.

If followed systematically and contingently by what is for that person a reinforcing consequence, an operant is likely to increase in frequency of occurrence. If followed systematically and contingently by an aversive consequence, or by the absence of any reinforcing consequence, an operant is likely to diminish in frequency of occurrence and ultimately to cease to occur. Work in recent years by Miller (1969) and many others establishes that even respondents have some sensitivity to contingent reinforcement, aversive or positive.

The implication of the foregoing in the context of clinical pain is that pain behaviours may occur for any of several reasons. Obviously, there may be nociception or, as in the case of central pain states, some other circumstances within the person. It is equally obvious to the behavioural scientist, however, that it is not necessary for nociception to be present for pain behaviours to occur. Pain behaviours may occur because of pain behaviour contingent positive reinforcement. Pain behaviours may also occur in the absence of nociception because they lead to the consequence of avoiding aversive events. That would be an instance of avoidance learning.

Once a pain problem begins and pain behaviours are emitted, there is inherently a certain vulnerability to learning/conditioning effects. How much conditioning, or how sure is it that conditioning will occur,

depends on the interplay of several sets of factors. These included persistence of nociception from time of injury. The longer nociception persists, the greater the possible impact of contingent reinforcement. In addition there is the extent to which the environment around the person is arranged such that pain behaviours are directly positively reinforced, or indirectly reinforced by leading to avoidance of aversive consequences (Fordyce, Shelton and Dundone, 1982) and the prior experience of the person which dictates in turn the anticipation of aversive or reinforcing consequences to the expression of pain behaviours. A person with much prior experience of persisting pain problems, or illness behaviours of another sort, which were positively reinforced by his/her milieu, could be expected to be more likely to persist in the expression of pain behaviours following an episode of nociception. The relevant prior experience could have been in any combination of positive reinforcement of pain behaviours and sanctioned avoidance of aversive contingencies.

Earlier, the disease model was characterized as a kind of closed system: the salient events mainly reside within the person. A behavioural model might be seen as an open system. That is, events critical to the occurrence/non-occurrence of pain behaviours may reside entirely outside the person in the present or anticipated environment.

Depending on semantics, a quite different set of terms could be used. Some hold that since nociception is peripheral to the central nervous system, the disease model of pain is a 'peripheral' system. Pain behaviours which appear to be dominated by such factors within the central nervous system as personality, motivation, or learning/conditioning effects can be seen as 'central'. Whichever way one goes with, 'central' vs. 'peripheral' seems not to be a critical issue. The critical issue is the recognition that events outside the person are capable of exercising a controlling influence over the persistence and course of the pain problem. It is not enough to ascribe the critical events to nociception or some form of physical findings or to personality or motivation, or even expectancy or cognitive set. The evaluation of problems of chronic pain require for their proper understanding a consideration of factors in the environment and in the previous learning/conditioning experiences of the person.

Implications

Pain behaviours may occur because of (i) nociception or other neurophysiological factors within the person; (ii) anticipated consequences based on prior learning or experience; (iii) the contingent consequences they meet, either positive or aversive. If this is accepted, powerful implications ensue.

There is a large and growing literature on the use of cognitive-behavioural methods in assessing and treating chronic pain (e.g. Engstrom, 1983; Turk and Genest, 1979). As it is such a diverse and complex area this chapter will make no attempt to deal with it but simply note its importance. It should be recognized that cognitive strategies are not entirely separable from the behavioural approaches described here. They will receive no further consideration here except to note that cognitive strategies in relation to pain management are based on the recognition that behaviour is influenced by cognitive processes as well as by environmentally rooted contingencies. In either case, factors critical to the pain problem are to be found in parameters quite outside the scope of a disease model perspective.

A pain problem which exists for more than a few days or weeks, can be seen as being vulnerable to conditioning effects. As a consequence, the evaluation of that pain problem and the determination of factors influencing the persistence of the pain behaviours cannot be considered adequate unless there is assessment of both intra-individual factors and individual-environmental contingency arrangements. The evaluation of chronic pain requires an on-going, symbiotic, interactive relationship between medical science and behavioural science. In addition to appropriate medically-based diagnostic procedures, there should be a behavioural analysis of the patient and his/her pain problem. There are alternative ways of doing this, just as there are alternative methods for medical diagnosis. Behavioural analysis of a pain problem is, however, a precision procedure; not simply an omnibus psychological work-up (Fordyce, 1976a, b; Heaton *et al.*, 1982). In addition, psychological tests may prove helpful. The best developed of these in the context of chronic pain is the Minnesota Multiphasic Pain Inventory (MMPI) (Bradley *et al.*, 1978; Fordyce, 1979; Freeman, Calsyn and Louks, 1976; Gentry and Cameron, 1975).

It is beyond the scope of this article to address in any detail treatment or management implications of a behavioural perspective on pain. A number of references can be consulted for details as to procedures (e.g. (Doleys, Crocker and Patton, 1982; Fordyce, 1976; Fordyce *et al.*, 1973; 1982; Redd, 1982; Roberts and Reinhardt, 1980) and results (Block, 1982; Follick Zitter and Ahern, 1982; Lassiter, 1982; Linton, 1982). A brief summary of major issues can also be found in Fordyce (1982). The essential features of a contingency management strategy for helping to cope with long standing pain problems focus on these aspects of the problem:

(1) *Analgesic medication.* If analgesics are being consumed at higher levels than appears reasonable from the apparent degree of nociception, they can be administered in a different way. They can be

changed from a pain behaviour contingent mode (i.e. 'as required' or p.r.n.) to a time contingent one. The selection of analgesics prescribed may also be changed and injections replaced by oral preparations (Halpern, 1977).

(2) *Rest and exercise arrangement.* Patients usually function in a working-to-tolerance mode: 'When the pain arises—or becomes severe—stop to rest.' This arrangement is shifted to working to quota (Doleys, Crocker and Patton, 1982; Fordyce, 1967). Following determination by direct observation of current tolerance for a given exercise or activity, quotas are assigned, with rest contingent on achieving the quota. Quotas are gradually increased.

(3) *Attention and social feedback* from health care professionals and family are addressed (Block, Kremer and Gaylor, 1980; Fordyce, 1976; Fordyce *et al.*, 1981; Redd, 1982). So far as is practical, treatment team members strive to let their attention occur in response to patient performance of treatment tasks, not to complaints of pain and suffering. Similar strategies are discussed with and worked on with family members.

A key element to behavioural strategies for helping people to bring about behaviour change—be they pain behaviours or others—is to help them to develop alternative behaviours. In the context of treating chronic pain, this means helping the person to become re-established in vocational, avocational, and family activities. The precise procedures are as diverse as the people with whom they may be used. The essential point is to recognize that helping a person to reduce or eliminate a behaviour (e.g. pain behaviour) without helping that person to develop workable alternatives is usually a futile enterprise. Moreover, it is easier to accelerate a behaviour (i.e., to increase the frequency of occurrence) incompatible with a behaviour to be decreased than it is to decelerate a well-established behaviour. It is easier, for example, to help a person increase standing and walking time than it is to decrease reclining because of pain.

It is important to recognize that these behavioural procedures are no less or no more committed to full informed consent than any other intervention. Patients and their families should and do receive full discussion and explanation as to what the treatment plan is to be before proceeding (Fordyce, 1976; Roberts and Reinhardt, 1980).

Behavioural and cognitive-behavioural methods for evaluating and treating chronic pain have been shown to be effective. Most of the increasing number of specialized pain clinics in various parts of the world appear to base a significant portion of their treatment on behavioural concepts. Yet most of the

health care delivery system, apart from specialized pain facilities, continues to view pain almost solely in disease model terms. The same may be said for law, agency policy, and adjudication procedures relating to pain. Perhaps this is but another instance of the axiom that one of life's most difficult tasks is to learn that what one knows to be true is not.

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