Assessment of patients with chronic pain

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Summary. Chronic pain is a public health concern affecting 20–30% of the population of Western countries. Although there have been many scientific advances in the understanding of the neurophysiology of pain, precisely assessing and diagnosing a patient’s chronic pain problem is not straightforward or well-defined. How chronic pain is conceptualized influences how pain is evaluated and the factors considered when making a chronic pain diagnosis. There is no one-to-one relationship between the amount or type of organic pathology and pain intensity, but instead, the chronic pain experience is shaped by a myriad of biomedical, psychosocial (e.g. patients’ beliefs, expectations, and mood), and behavioural factors (e.g. context, responses by significant others). Assessing each of these three domains through a comprehensive evaluation of the person with chronic pain is essential for treatment decisions and to facilitate optimal outcomes. This evaluation should include a thorough patient history and medical evaluation and a brief screening interview where the patient’s behaviour can be observed. Further assessment to address questions identified during the initial evaluation will guide decisions as to what additional assessments, if any, may be appropriate. Standardized self-reported instruments to evaluate the patient’s pain intensity, functional abilities, beliefs and expectations, and emotional distress are available, and can be administered by the physician, or a referral for in depth evaluation can be made to assist in treatment planning.

Keywords: assessment; chronic pain; measurement; multidimensional

Pain is an extremely prevalent symptom. Chronic pain alone is estimated to affect 30% of the adult population of the USA, upwards of 100 million adults. In addition to being highly prevalent, pain is exceedingly costly to the individual with chronic pain, his or her significant others, and society. The expenses for chronic pain involve not only traditional healthcare but also indirect costs such as lost productivity at work, lost tax revenue, legal services, and disability compensation. Estimates of the total annual costs of chronic pain (including treatment, lost work days, disability payments, and legal fees) in the USA range from US$550 to 625 billion per year.

Despite the soaring cost of treating people with chronic pain, relief for many remains elusive and complete elimination of pain is rare. Although there have been substantial advances in the knowledge of the neurophysiology of pain, along with the development of potent analgesic medications and other innovative medical and surgical interventions, on average the amount of pain reduction by available procedures is 30–40% and this occurs in fewer than one-half of treated patients. Thus, the majority of people with painful conditions continue to experience significant pain that impairs their quality of life, causing significant physical disability and emotional distress.

How we think about pain influences the way in which we go about evaluating patients. Many clinicians and the lay public alike assume that some underlying pathology is both a necessary and sufficient cause of the symptoms experienced. Consequently, assessment usually begins with a thorough history and physical examination, followed, when deemed appropriate, by laboratory tests and diagnostic imaging procedures in an attempt to identify or confirm the presence of any underlying pathology that causes the symptom—the so-called pain generator. In the absence of identifiable organic pathology, the healthcare provider may assume that the report of symptoms stems from psychological factors and may request a psychological evaluation to detect the emotional factors underlying the patient’s report. Thus, there is a duality where the report of symptoms is attributed to either somatic or psychogenic mechanisms. This dichotomous view has been the predominant model that has been the basis for medical practice, dating back at least to Descartes in 1644. It is, however, incomplete and is not supported by available research or the current understanding of chronic pain. Although the traditional biomedical approach may be appropriate for assessing acute pain,

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and even here psychological factors should be considered, several puzzling observations challenge the presumed isomorphism between pain and organic aetiology. For example, the organic bases for some of the most common and recurring acute (e.g. headache) and chronic (e.g. back pain, fibromyalgia (FM)) pain problems are largely unknown,\(^5\) while on the other hand, asymptomatic individuals may have structural abnormalities such as herniated discs that would explain pain if it were present.\(^6\) Thus, we lack adequate explanations for patients with no identified organic pathology who report severe pain and pain-free individuals with significant, objective pathology.

Chronic pain affects more than just the individual patient, but also his or her significant others (partners, relatives, employers and co-workers and friends), making appropriate treatment essential. Satisfactory treatment can only come from comprehensive assessment of the biological aetiology of the pain in conjunction with the patient’s specific psychosocial and behavioural presentation, including their emotional state (e.g. anxiety, depression, and anger), perception and understanding of symptoms, and reactions to those symptoms by significant others.\(^8\) A key premise is that multiple factors influence the symptoms and functional limitations of individuals with chronic pain. Thus, a comprehensive assessment is needed that addresses biomedical, psychosocial, and behavioural domains, as each contributes to chronic pain and related disability.\(^10\)\(^11\)

**Comprehensive assessment of the person with chronic pain**

Turk and Meichenbaum\(^12\) suggested that three central questions should guide assessment of people who report pain:

(i) What is the extent of the patient’s disease or injury (physical impairment)?

(ii) What is the magnitude of the illness? That is, to what extent is the patient suffering, disabled, and unable to enjoy usual activities?

(iii) Does the individual’s behaviour seem appropriate to the disease or injury, or is there any evidence of symptom amplification for any of a variety of psychological or social reasons (e.g. benefits such as positive attention, mood-altering medications, financial compensation)?

To answer these questions, information should be gathered from the patient by history and physical examination, in combination with a clinical interview, and through standardized assessment instruments. Healthcare providers need to seek any cause(s) of pain through physical examination and diagnostic tests while concomitantly assessing the patient’s mood, fears, expectancies, coping efforts, resources, responses of significant others, and the impact of pain on the patients’ lives.\(^11\) In short, the healthcare provider must evaluate the ‘whole person’ and not just the pain.

Because there is no ‘pain thermometer’ that can provide an objective quantification of the extent or severity of pain experienced by the patient, it can only be assessed indirectly based on a patient’s overt communication, both verbal and nonverbal. Regardless of whether a biological basis for the pain can be ascertained, or whether psychosocial problems were caused by, or resulted from pain, the assessment process can be helpful in identifying how biomedical, psychosocial, and behavioural factors interact to influence the nature, severity, persistence of pain and disability, and response to treatment. It is important to note that our discussion below is intended for the adult with chronic pain; a modified assessment procedure may be necessary when evaluating children\(^13\) or older individuals who may require specific measures and methods.\(^14\)

**History and medical examination**

The general goals of the history and medical evaluation are to: (i) determine the necessity of additional diagnostic testing; (ii) determine if medical data can explain the patient’s symptoms, symptom severity, and functional limitations; (iii) make a medical diagnosis; (iv) evaluate the availability of appropriate treatment; (v) establish the objectives of treatment; and (vi) determine the appropriate course for symptom management if a complete cure is not possible.

Relying exclusively on a medical examination to diagnose a chronic pain disorder can be risky. Although clinical judgement is often relied on during routine clinical assessment of chronic pain patients, agreement among physicians is surprisingly low, even when using standard mechanical devices.\(^15\)\(^16\) An additional complexity is that patient reports of pain severity often demonstrate modest associations with objective physical and laboratory findings: there is no direct linear relationship between the amount of detectable physical pathology and the reported pain intensity. Significant numbers of patients that report chronic pain demonstrate no physical pathology using plain radiographs, computed axial tomography scans, or electromyography (an extensive literature is available on physical assessment, radiographic and laboratory assessment procedures to determine the physical basis of pain),\(^17\) making a precise pathological diagnosis difficult or impossible. Despite these limitations, the patient’s history and physical examination remain the basis of medical diagnosis, can provide a safeguard against over-interpreting findings from diagnostic imaging that are largely confirmatory, and can be used to guide the direction of further evaluation efforts.

**Interview**

In addition to this standard medical evaluation approach, an appropriate patient assessment requires an evaluation of the myriad psychosocial and behavioural factors that influence the subjective report of the characteristics of the pain, which can be done through interviewing. Table 1 summarizes these salient issues with the acronym ‘ACT-UP’ (Activity, Coping, Think, Upset, People’s responses) that can be used as a guide for a brief screening interview for clinicians. Pending the outcome of this screening interview, patients...
can be referred for a more extensive psychological interview. When conducting either screening or more detailed interviews, in addition to collecting factual information, the healthcare professional should observe the behaviour of the patient while attending to the patient’s and significant others’ thoughts and feelings. Specifically, the extent that a patient adheres to their therapeutic intervention may depend on their emotional state, beliefs about the cause of their pain, and the pathway to treatment. A habitual pattern of maladaptive thoughts may contribute to a sense of hopelessness, dysphoria, and unwillingness to engage in activity for fear of amplifying pain and causing additional tissue damage. This may be especially problematic if the patient erroneously believes the pain can be (must be) completely eliminated. Thus, the interviewer should determine both the patient’s and, when possible, significant others’ expectancies and goals for treatment, and be aware of any dissonance between these factors. Attending to the temporal association of these cognitive, affective, and behavioural events, their specificity vs generality across situations, and the frequency of their occurrence in relation to the pain experience will help to provide context to the patient’s circumstance and may identify triggering events or pain moderators.

In addition, patients with chronic pain problems often consume a variety of medications. It is important to discuss a patient’s current medications during the interview, as many pain medications are associated with side-effects that may cause or mimic emotional distress. Healthcare providers should not only be familiar with medications used for chronic pain, but also with side-effects from these medications that result in fatigue, sleep difficulties, and mood changes to avoid misdiagnosis of depression.

### Standardized pain assessment

Information obtained from the interview can be invaluable as a means to determine which, if any, further assessments should be administered that are of particular relevance to the specific patient. In addition to the interview, self-report measures have become the gold standard for the assessment of patients reporting pain, including relevant contributing factors. A number of assessment instruments have been developed and published to evaluate patients’ attitudes, beliefs, symptoms, emotions, quality of life, and expectancies about themselves and the healthcare system. There are numerous advantages to standardized instruments over interviews: they are easy and inexpensive to administer, quickly assess a wide range of behaviours, obtain information about behaviours that patients may feel uncomfortable about disclosing (sexual relations) or are unobservable (thoughts, emotional arousal) and, most importantly, their reliability and validity can be assessed. Rather than replacing interviews, standardized instruments should complement interviewing as the findings may suggest issues to be addressed in greater detail during a subsequent interview or investigated with other measures (Table 2 provides a sample of standardized pain assessment tools that can be utilized for a comprehensive pain assessment).

### Pain intensity

With limited time to assess pain, unidimensional self-report measures are often administered that ask patients to quantify their pain intensity by providing a single, general rating. Among the most commonly used are numerical rating scales (NRS) that ask patients to ‘Rate your typical pain on a scale from 0 to 10 where 0 equals no pain and 10 is the worst pain you can imagine’ and verbal rating scales (VRS) that instead use verbal descriptors and ask the patient to report ‘Is your usual level of pain “mild”, “moderate”, or “severe”?’

Both the NRS and VRS appear sufficiently reliable and valid; no one method consistently demonstrates greater responsiveness in detecting improvements associated with pain treatment. However, there are important differences among NRS and VRS measures of pain intensity with respect to missing data, including failure to complete the measure, patient preference, ease of data recording and ability to administer the measure by telephone or with electronic diaries. Patients who are unable to complete NRS ratings may be able to complete VRS pain ratings more easily but VRS measures are difficult for language-impaired individuals to complete.

A complicating factor for unidimensional ratings of pain intensity is that the type of information obtained can vary greatly depending upon contextual details of the question. Specifically, consideration should be given to the level of pain severity patients are asked to rate (e.g. least pain, pain on average, and most severe pain), the area of pain (e.g. pain in a specific location vs whole body pain), circumstances (pain at rest vs movement), and the time frame that patients are asked recall upon to report their pain (e.g. current pain vs pain over the past week vs pain over the past month).

The use of daily diaries is believed to be more accurate as they are based on real-time rather than recall. Patients may be asked to maintain regular diaries of pain intensity with ratings recorded several times each day (e.g. meals and bedtime) for several days or weeks and multiple pain ratings can be averaged across time. One problem noted

### Table 1 Brief psychosocial screening: ACT-UP

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Activities: how is your pain affecting your life (i.e. sleep, appetite, physical activities, and relationships)?</td>
</tr>
<tr>
<td>2.</td>
<td>Coping: how do you deal/cope with your pain (what makes it better/worse)?</td>
</tr>
<tr>
<td>3.</td>
<td>Think: do you think your pain will ever get better?</td>
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<tr>
<td>4.</td>
<td>Upset: have you been feeling worried (anxious)/depressed (down, blue)?</td>
</tr>
<tr>
<td>5.</td>
<td>People: how do people respond when you have pain?</td>
</tr>
</tbody>
</table>
with the use of paper-and-pencil diaries is that patients may
not follow the instruction to provide ratings at specified inter-
vals. Rather, patients may complete diaries in advance (‘fill
forward’) or shortly before seeing a clinician (‘fill back-
ward’), undermining the putative validity of diaries. Elec-
tronic diaries have gained acceptance in some research
studies to avoid these problems.

Pain quality and pain location

In addition to intensity, pain is known to have different sensory
and affective qualities. Understanding the quality of a patient’s
pain through assessment can identify treatments that are ef-
fective for certain types of pain independent of pain severity.
Characteristics of pain (e.g. aching and stabbing) are also
important as they may assist selection of treatment.

### Table 2 Sample of standardized tools for chronic pain assessment

<table>
<thead>
<tr>
<th>Measure</th>
<th>Number of items</th>
<th>Domain assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unidimensional pain measures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Numerical Rating Scale (NRS)</td>
<td>20</td>
<td>Pain intensity using a numbered scale (e.g. 0–10, 0–100)</td>
</tr>
<tr>
<td>Verbal Rating Scale (VRS)</td>
<td>1</td>
<td>Pain intensity using verbal descriptors (e.g. mild, moderate, severe)</td>
</tr>
<tr>
<td>Visual Analog Scale (VAS)</td>
<td>1</td>
<td>Pain intensity using 10 or 100 mm line, anchored by no pain and worst possible pain</td>
</tr>
<tr>
<td>Facial Pain Scale (FPS)</td>
<td>1</td>
<td>Pain intensity using a range of facial expressions</td>
</tr>
<tr>
<td>Pain thermometer</td>
<td>1</td>
<td>Pain intensity using a depicted thermometer to rate pain</td>
</tr>
<tr>
<td><strong>Pain quality and location</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>McGill Pain Questionnaire (MPQ)</td>
<td>20</td>
<td>Pain quality, location, exacerbating, and ameliorating factors</td>
</tr>
<tr>
<td>Short-form-McGill Pain Questionnaire-2 (SF-MPQ-2)</td>
<td>22</td>
<td>Pain quality, location, exacerbating, and ameliorating factors</td>
</tr>
<tr>
<td>Neuropathic Pain Scale (NPS)</td>
<td>10</td>
<td>Neuropathic pain qualities</td>
</tr>
<tr>
<td>Regional Pain Scale (RPS)</td>
<td>19</td>
<td>Extent of body pain</td>
</tr>
<tr>
<td><strong>Pain interference and function: general</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain Disability Index (PDI)</td>
<td>7</td>
<td>Pain disability and interference of pain in functional, family, and social domains</td>
</tr>
<tr>
<td>Brief Pain Inventory (BPI)</td>
<td>32</td>
<td>Pain intensity and interference of pain with functional activities</td>
</tr>
<tr>
<td>PROMIS pain interference and pain behaviours item banks</td>
<td>Interference Bank: 41; Behaviours Bank: 39</td>
<td>Pain interference and behaviours related to the impact of pain</td>
</tr>
<tr>
<td>Functional Independence Measure</td>
<td>18</td>
<td>Physical and cognitive ability, burden of care</td>
</tr>
<tr>
<td><strong>Pain interference and function: disease specific</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western Ontario MacMaster Osteoarthritis Index (WOMAC)</td>
<td>24</td>
<td>Pain and function in people with osteoarthritis</td>
</tr>
<tr>
<td>Fibromyalgia Impact Questionnaire (FIQ)</td>
<td>20</td>
<td>Health status for people with fibromyalgia</td>
</tr>
<tr>
<td>Roland-Morris Disability Questionnaire (RDQ)</td>
<td>24</td>
<td>Pain and disability for people with back pain</td>
</tr>
<tr>
<td><strong>HRQOL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Outcomes Study Short Form Health Survey (SF-36)</td>
<td>36</td>
<td>Mental and physical health</td>
</tr>
<tr>
<td>West Haven-Yale Multidimensional Pain Inventory (MPI)</td>
<td>60</td>
<td>Pain severity, interference, mood, activities, sense of control, support, quality of life</td>
</tr>
<tr>
<td>EuroQOL (EQ-5D)</td>
<td>5</td>
<td>Health status, pain, and mood</td>
</tr>
<tr>
<td>Sickness Impact Profile (SIP)</td>
<td>136</td>
<td>Physical and psychosocial dysfunction</td>
</tr>
<tr>
<td><strong>Psychosocial measures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beck Depression Inventory (BDI)</td>
<td>21</td>
<td>Depressive mood</td>
</tr>
<tr>
<td>Profile of Mood States (POMS)</td>
<td>65</td>
<td>Mood and emotional functioning</td>
</tr>
<tr>
<td>Symptom Checklist-90 Revised (SCL-90R)</td>
<td>90</td>
<td>Multiple domains of psychological functioning</td>
</tr>
<tr>
<td>Pain Catastrophizing Scale (PCS)</td>
<td>13</td>
<td>Catastrophic thoughts related to pain</td>
</tr>
<tr>
<td>Coping Strategies Questionnaire (CSQ)</td>
<td>10</td>
<td>Coping strategies for chronic pain</td>
</tr>
<tr>
<td><strong>Observational pain assessment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain Behaviour Checklist (PBC)</td>
<td>16 Categories</td>
<td>Observational measure to assess patient’s pain behaviours</td>
</tr>
<tr>
<td>Real-time assessment of pain behaviour</td>
<td>5 Categories</td>
<td>Real-time assessment of pain behaviours integrated with a standardized assessment</td>
</tr>
</tbody>
</table>
addition, assessment can be enhanced through the use of simple pain diagrams that ask patients to indicate on a drawing of the human body the location of their pain. For example, the McGill Pain Questionnaire (MPQ) assesses three categories of word descriptors of pain qualities (sensory, affective, and evaluative) and includes a body diagram for patients to identify the area of their pain. A revised and extended version of this scale [Short-Form McGill Pain Questionnaire revised (SF-MPQ-2)] has also been developed and is one of the most frequently used measures to assess pain characteristics.

Pain interference with function and quality of life

The impact of chronic pain on function can be subdivided into patients' physical capacities, the ability of patients to perform activities of daily living and their ability to function in adult roles such as employment. Focus groups of people with persistent pain indicate that their overall physical functioning was degraded because of their pain, supporting the recommendation that assessment of functioning should be an integral part of pain assessment. The ability (or inability) to perform necessary and desired functions, in turn, can significantly impact quality of life. Poor reliability and questionable validity of physical examination measures has led to the development of self-report functional status measures to quantify symptoms, function, and behaviour directly, and the severity of pain when performing specific activities (e.g. ability to walk up stairs or lift specific weights, sitting for specific periods of time) associated with different types of painful conditions (e.g. osteoarthritis, low back pain). Research has demonstrated the importance of assessing overall health-related quality of life (HRQOL) in chronic pain patients in addition to function. There are a number of well established, psychometrically supported HRQOL measures [Medical Outcomes Study Short-Form Health Survey (SF-36)], general measures of physical functioning [e.g. Pain Disability Index (PDI)], and disease-specific measures [e.g. Western Ontario MacMaster Osteoarthritis Index (WOMAC), Roland-Morris Back Pain Disability Questionnaire (RDQ)] to assess function and quality of life. Disease-specific measures are designed to evaluate the impact of a specific condition (e.g. pain and stiffness in people with osteoarthritis), whereas generic measures make it possible to compare physical functioning associated with a given disorder and its treatment with that of various other conditions. Specific effects of a disorder may not be detected when using a generic measure; therefore, disease-specific measures may be more likely to reveal clinically important improvement or deterioration in specific functions as a result of treatment. General measures of functioning may be useful to compare patients with a diversity of painful conditions. The combined use of disease-specific and generic measures facilitates the achievement of both objectives.

Emotional distress and coping

The results of numerous studies suggest that chronic pain is often associated with emotional distress, particularly depression, anxiety, anger, and irritability. The presence of emotional distress in people with chronic pain presents a challenge when assessing symptoms such as fatigue, reduced activity level, decreased libido, appetite change, sleep disturbance, weight gain or loss, and memory and concentration deficits, as these symptoms can be the result of pain, emotional distress, or treatment medications prescribed to control pain. Instruments have been developed specifically for pain patients to assess psychological distress, the impact of pain on patients' lives, feeling of control, coping behaviours, and attitudes about disease, pain, and healthcare providers. For example, the Beck Depression Inventory (BDI) and the Profile of Mood States (POMS) are psychometrically sound for assessing symptoms of depressed mood, emotional distress, and mood disturbance, and have been recommended to be used in all clinical trials of chronic pain; however, the scores must be interpreted with caution and the criteria for levels of emotional distress may need to be modified to prevent false positives.

Overt expressions of pain

Patients express pain verbally through self-report and nonverbally by displaying pain behaviours, which are the controllable and uncontrollable actions and facial expressions that convey the experience of pain, distress, and suffering. These behaviours are important as they have a communicative function and are capable of eliciting responses from significant others (including healthcare providers). Also, they can contribute to the maintenance of behaviours when they receive attention and are reinforced in other ways (e.g. cues to take medication and avoid activity). Much like standardized self-report assessments, standardized observational procedures have been developed to quantify pain behaviours [e.g. Pain Behaviour Checklist (PBC)] but are most often utilized in clinical research settings. General observation of pain behaviours, and how they are responded to by significant others, can be made in many settings such as the waiting room or while being interviewed; however, the context in which the patient is observed must be considered as it may influence behaviour (e.g. pain behaviours may differ if a significant other is present). In addition, investigation of the patient's healthcare and medication usage patterns can be used to assess pain behaviours, where diaries can be completed to track the frequency and quantity of medications, and antecedent and consequent events of medication use (e.g. stress and activity) that may be associated with factors other than pain.

Conclusion

Given the multidimensional nature of chronic pain, efficacious assessment, and treatment requires a comprehensive, multiaxial approach. Traditional biomedical approaches can be effective only as a starting point for assessment and should be accompanied by interviewing and standardized assessment tools to uncover the potential social, emotional, cognitive, environmental, and behavioural factors that...
shape the chronic pain experience. Successful treatment of patients with chronic pain can only be accomplished if our assessment efforts focus on the entire person, not just the organic pathology. In this article, we can only highlight the components of such an evaluation; more detail is available in a recent volume.17

Authors’ contributions
E.J.D. and D.C.T. both contributed to the planning, preparation, and writing of this manuscript.

Declaration of interest
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