

From ladder to platform: a new concept for pain management

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ABSTRACT

BACKGROUND: Pain remains one of the top five reasons for consultations in general practice, presenting either alone or as comorbidity. The World Health Organization (WHO) analgesic ladder proposed in 1986 has been the cornerstone of pain management, but is often inadequate in daily practice, especially when dealing with the diverse nature and etiology of various pain conditions. There is a need for a better concept which is universally applicable that acknowledges the value of, and need for, other domains of treatment for pain.

OBJECTIVE: This article reviews the original ideas of the WHO analgesic ladder and proposes its extension to a platform model in the context of pain management.

DISCUSSION: Pain affects both the physical and psychological wellbeing of patients and should not be treated with pharmacotherapy alone. The model of WHO analgesic ladder provides guidelines for choosing the analgesic agents, but has its limitations. Incorporating the latest paradigm of neuromatrix theory, both acute and chronic pain should be best managed with a broader perspective incorporating multimodal non-pharmacological and supportive treatments, illustrated by the concept of interacting domains on a broad platform as presented in this article. Different levels of pain severity and chronicity necessitate different analgesic platforms of management, and the clinician should move up or down the appropriate platform to explore the various treatment options as per the status and needs of the patient.

KEYWORDS: Analgesic ladder; pain management; analgesic platform

The original WHO analgesic ladder

In 1986, the World Health Organization (WHO) published a set of guidelines regarding the use of analgesics in treating cancer pain.¹ It described a three-step approach of sequential use of pharmacological agents commensurate with the pain level as reported by the patient. This stepwise concept with practical recommendations eponymously became the analgesic ladder which was later translated into 22 languages and became one of the most adopted standards for general pain therapy in the next three decades (see Figure 1).² Moving up from no treatment, the original ladder model starts with non-opioids (e.g. aspirin, paracetamol or nonsteroidal anti-inflammatory drugs, NSAIDs) for mild pain, then increasing to weak opioids like codeine and its derivatives as the second step for intermediate level of pain,

and finally escalating to strong opioids like morphine, methadone and even fentanyl as the third step for the highest level of pain (Figure 1).

Apart from the choice of pharmacological agents, the original analgesic ladder states that:³

- assessment of the patient is necessary prior to initiation and at regular intervals of therapy
- oral form of analgesics is preferred wherever possible
- analgesic should be given at regular intervals rather than on demand
- there is no standardised dosage and therapy should be individualised according to the level of pain as perceived
- the central aim is to relieve as much pain as possible
- adjuvant treatment should be added where necessary.

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Advantages of the analgesic ladder

The original ladder was put forward to address the prevalent obstacles of effective cancer pain relief at that time, which included inadequate training amongst carers in cancer pain management, overt fear of addiction, poor drug availability and lack of public awareness. It both legitimises and rationalises the use of opioids in a cost-effective way for cancer pain. Two years after launching, the analgesic ladder was already validated to be useful in 80–90% of cases.⁴ The guidelines were further revised in 1997 and their efficacies have stood the test of time. Because of its step-by-step concept, the ladder approach is extended to management of acute and chronic pain, and modified in various specialties.

Controversies and limitations of the WHO ladder

Right from the start

We may take for granted that NSAIDs are the bedside norm for mild acute pain, the evidence for standalone use in mild chronic and cancer pain is still inconclusive. Studies, however, have shown additional benefits of NSAIDs when used in combination with opioids for moderate to severe pain.^{5–7} North American physicians are less enthusiastic in general than their European colleagues in prescribing long-term NSAIDs for fear of gastrointestinal and renal complications.⁸

The value of the second step

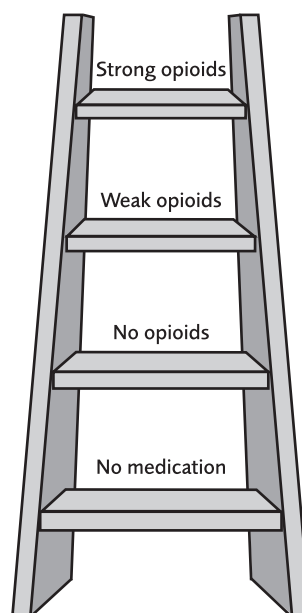
The role of weak opioids (e.g. codeine, dihydrocodeine, dextropropoxyphene and tramadol) as the second step is also intensely debated. Two studies have shown better pain control with these step 2 agents as compared to morphine.^{9,10} One randomised controlled trial favoured using strong (step 3) opioids as initial agents for cancer pain and question the need of weak opioids;¹¹ however, the validity of this was confounded by the use of a number of opioids at varying doses and 50% controls do not have matching levels of pain. Two other studies using transdermal fentanyl patches (step 3 opioid) demonstrated that 25µg/hr patches produce good pain relief in opioid-naïve patients with chronic pain, omitting the need for step 2 of the WHO ladder.^{12,13}

Thus said, in managing chronic pain, it would not be advisable to proceed to fentanyl patches too soon without properly titrating the actual opioid requirement. In fact, for cancer-type pain with breakthrough phenomena, fentanyl patches may not be a suitable choice due to their 72-hour long-acting nature and relative lack of dose gradation.

Taboo of switching agents or using more than two agents in the same rung

The original ladder advises against using two or more agents of the same rung simultaneously.³ Nowadays, this advice is seldom adhered to. In managing mild acute pain, it is not unusual to prescribe both paracetamol and NSAIDs in step 1 of the ladder. For moderate to severe chronic and cancer pain, it is now standard practice to give a long-acting opioid for basal control of pain plus a short-acting opioid for breakthrough pain.¹⁴ In managing rheumatological pain, it is

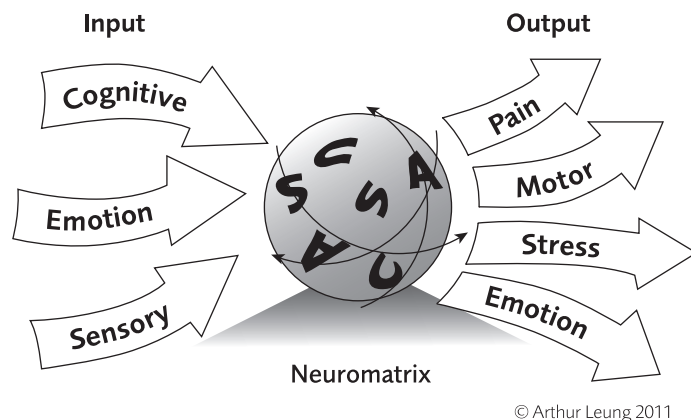
Figure 1. The original WHO analgesic ladder



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This shows the stepwise recommendation of pharmacotherapy from non-opioids (e.g. acetaminophen, aspirin, NSAIDs), weak opioids (e.g. codeine, hydrocodone, tramadol) to strong opioids (morphine, hydromorphone, fentanyl)

Figure 2. The concept of the neuromatrix theory for pain



Itself visualised as an entity (like an incessant spinning sphere) comprising the somatosensory (S), cognitive (C) and affective (A) domains, it receives inputs from areas of the brain governing sensation, emotions and cognitions and, in return, churns out a neurosignature (output) which activates various programmes for pain recognition, motor response, emotional and stress reactions. (Adapted from Melzack, Evolution of the neuromatrix theory of pain. The Prithvi Raj Lecture: presented at the third World Congress of World Institute of Pain, Barcelona 2004. *Pain Pract.* 2005 Jun;5(2):85–94.)

often necessary to try two or three NSAIDs and even use them in combination, as failure of one agent does not predict inefficacy of another.¹⁵ Similarly, switching between different types and deliverable forms of potent opioids (step 3 of the analgesic ladder) in cancer pain is now commonly practised to achieve better outcomes and lesser toxicity.¹⁶

From rungs to platforms: time to think broad

Pain in human beings, whether acute or chronic, has both physical and psychological components. Theories of pain have also moved from the original linear concept of gate-control¹⁷ to the latest three-dimensional neuromatrix system,¹⁸ incorporating the emotional and cognitive domains with the processing of pain signals in the central nervous system (see Figure 2). In the same line of thought, management of pain should no longer be a linear direction going up or down the narrow rungs of a ladder. Rather, it should be conceptualised as various levels of analgesic platforms extending horizontally from the rungs of the analgesic ladder, on which other domains to alleviate pain in addition to the recommended

analgesics are poised in an interactive way. These domains include:

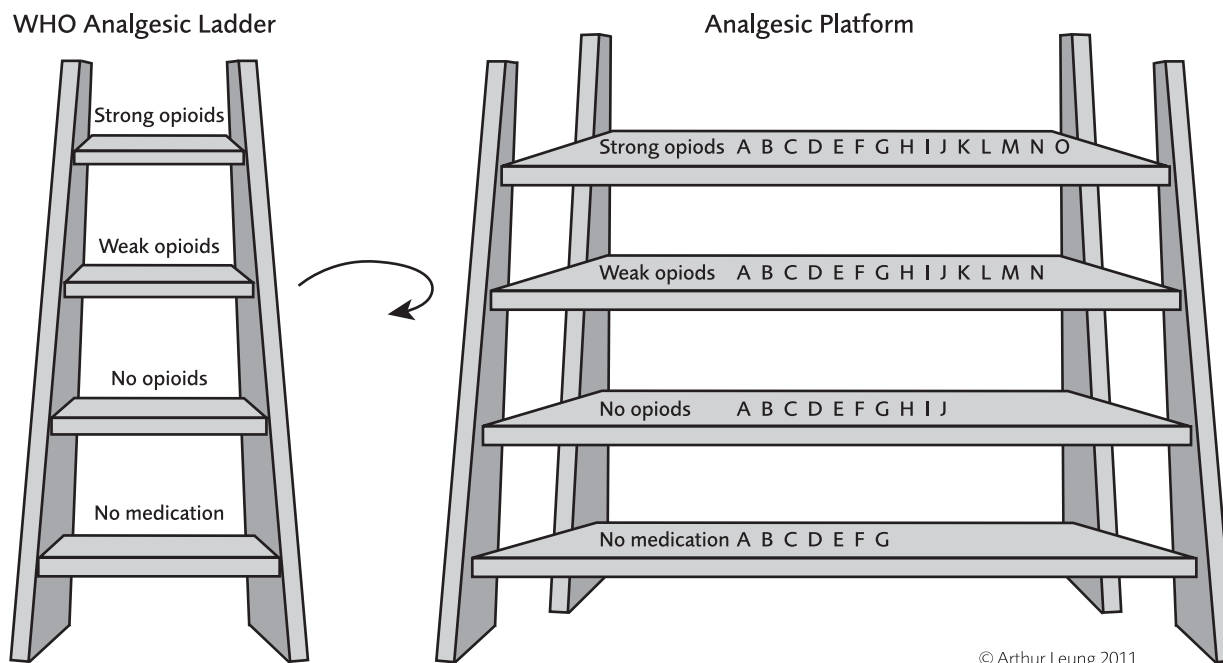
- adjuvant pharmacological agents like muscle relaxants (e.g. cyclobenzaprine, baclofen and dantrolene), anticonvulsants (e.g. gabapentin, pregabalin and lamotrigine), antidepressants (e.g. tricyclics, SSRI, SNRI), injectable agents (steroids, local anaesthetics), compounds that act synergistically with opioids like cannabinoids (nabilone)
- physiotherapy and physical therapy
- surgical and neurosurgical procedures (e.g. spinal cord stimulation, deep brain stimulation, spinal delivery of opioids, ganglion ablation by phenol or electrofrequency, sympathectomy)
- cognitive behavioural therapy and psychological counselling
- interpersonal reinforcement (e.g. support group)
- mind–body integration (e.g. yoga, meditation and religious support)
- hypnosis and relaxation therapy
- acupuncture and chiropractic
- other complementary and alternative medicine (CAM) options.

Each of these domains can be present in every platform and should be considered as an adjunct where appropriate. Depending on the chronicity and severity of the pain and physical/psychosocial construct of the patient, the clinician moves up or down the platforms in time enlisting different domains (Figure 3), similar to the traditional WHO analgesic ladder which stipulates different choice of pharmacological agents. However, unlike the traditional ladder which needs frequent modifications, either with extra rungs^{2,19} for cancer or severe types of pain, or fast-tracking² in cases of acute pain, this novel concept of analgesic platform model is universally applicable to all pain scenarios, capable of describing the dynamics of pain management in a broader and holistic manner.

Relevance in general practice

This platform modification of the original WHO analgesic ladder extends the concept of pain management from an up–down linear pharmacological adjustment to a broader three-dimensional

Figure 3. Change of concept from the analgesic ladder to the analgesic platform



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A—Physiotherapy and physical therapy | B—Mind–body integration (e.g. yoga, meditation and religious support) | C—Hypnosis and relaxation therapy | D—Acupuncture | E—Chiropractic | F—External rub/lotions | G—Other CAM options (Tai chi, Tui Na) | H—Muscle relaxants (e.g. cyclobenzaprine, baclofen and dantrolene) | I—Injectable agents (steroids, local anaesthetics) | J—Interpersonal reinforcement (e.g. support group) | K—Anticonvulsants (e.g. gabapentin, pregabalin and lamotrigine) | L—Antidepressants (e.g. tricyclics, SSRI, SNRI) | M—Compounds that act synergistically with opioids like cannabinoids (nabilone) | N—Cognitive behaviour therapy and psychological counselling | O—Surgical and neurosurgical procedures (e.g. spinal cord stimulation, deep brain stimulation, spinal delivery of opioids, ganglion ablation by phenol or electrofrequency, sympathectomy)

perspective that encompasses other domains and disciplines of therapies. Adopting this novel analgesic platform concept will not only remind practising clinicians to think and act broadly in seeking solutions, it will also align the treatment goals with the modern neuromatrix theory in dealing with acute and chronic pain. In primary care, the analgesic platform is of particular relevance as patients with pain often present to their primary care providers with psychosocial overlays that are best approached and managed with a broad and multimodal horizon.

Case study 1

A 56-year-old retired manual labourer with four years' history of chronic back pain as a result of traumatic herniation of L5/S1 disc. He underwent discectomy which gave him little improvement, and he experienced constant sharp pain in his lower back which would often radiate down to

both of his thighs. Patient responded initially to non-steroidal anti-inflammatory drugs, but soon proceeded to codeine and hydrocodone. He tried three courses of physiotherapy and noticed very slight benefits. He was given amitriptyline but developed dizziness. As you reviewed his file, a pain specialist recommended that the patient should be moved up the analgesic ladder for stronger choices like morphine or hydromorphone. On examination, patient seemed distressed and tired. Further questioning revealed recent stress in the patient's family with ongoing financial difficulties. Patient also admitted having poor quality of sleep and depressed mood, albeit lack of suicidal ideation. You realised that there were coexisting psychosocial issues in the patient's life that could perpetuate and, in fact, exacerbate the chronic pain conditions. Hence, you decide to think broad and adopt the analgesic platform, adding in duloxetine 30mg which would help both of his mood and neuropathic pain and a muscle relaxant to relieve

the muscle spasm. You also suggested a meditation class and structured stretching exercises for his back. Last but not least, you enrolled him for a support group for chronic pain counselling. Patient made steady improvement in the next six months, gradually stepping down to non-opioid platform (NSAIDs) with the addition of a low-dose pregabalin.

Case study 2

A 35-year-old professional footballer came to consult about pain in his right knee. A previous injury of that knee had involved partially torn cruciate ligaments. After successful repair, he still felt dull pain and stiffness in the knee at times. He consciously stayed away from any opioid containing analgesia for fear of affecting his professional career. He used up to 3 g of paracetamol plus 1.8 g of ibuprofen and reported the pain as 5/10. You reviewed his musculoskeletal pain and realised that moving up to opioid analgesia is not an option; hence, you went horizontally along the analgesic platform and suggested a combination of physiotherapy, muscle relaxants, massage therapy and acupuncture. In three months, patient went back to his football games with a manageable pain level of 2/10.

Case study 3

A 65-year-old gentleman suffered from intractable pain due to disseminated carcinomatosis and nerve root compression from metastatic vertebral collapse. He took continuous-release hydromorphone 60 mg twice a day and short acting hydromorphone 8 mg tablets up to six times a day for breakthrough pain. He consulted you for better pain control as part of his palliative care. In view of the high demand of narcotics and the need for constant titration, you discarded the option of fentanyl patch even though it is indicated at the highest rung of the traditional WHO analgesic ladder. Instead you adopted the analgesic platform concept and enlisted the help of neurosurgeon and palliative care physicians, who arranged for the patient to have continuous intrathecal morphine pump. Patient experienced remarkable pain relief and significant improvement in his mood in the following three months until he died.

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COMPETING INTERESTS
None declared.