

# Non-cardiac Chest Pain: An interdisciplinary algorithm for clinical care

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**Abstract:** Non-cardiac chest pain (NCCP) is a common clinical presentation marked by long-term impairments in functioning, reduced quality of life, and over-utilisation of the health care system. Considering the widespread recognition that NCCP involves a complex dynamic of interrelated biopsychosocial influences, evidence-based multidisciplinary approaches to assessment and management increasingly are being recommended.

Yet, despite the frequency with which neuromusculoskeletal (NMS) dysfunctions are implicated in the aetiology of this disorder, NMS specialties (such as chiropractic) typically receive short shrift in extant multidisciplinary models.

Accordingly, the present paper proposes an interdisciplinary algorithm for clinical care that, if validated by subsequent research, may hold promise for improving collaboration between allopathic and chiropractic practitioners, enhancing patient outcomes, and reducing the financial burden of patient care. Implications for empirically-supported refinements of the algorithm are discussed and future research directions are highlighted.

**Indexing Terms:** Chiropractic; chest pain; non-cardiac pain; clinical algorithm.

## Introduction

**N**on-cardiac (or what is often called ‘unexplained’ or ‘atypical’) chest pain (NCCP) is a common clinical presentation affecting perhaps 20% or more of the population, with a comparable ratio of men to women. (1, 2, 3, 4, 5, 6, 7, 8) Although cardiac and other potentially life-threatening causes (e.g., coronary artery disease, pulmonary embolism, pneumonia) are ruled out for most chest pain complaints, excluding these risks often involves invasive and financially expensive diagnostic procedures, (2, 4, 7, 9, 10, 11, 12)

Indeed, the potentially fatal consequences of misdiagnosis compounded by some physicians’ malpractice concerns (13) result in ‘*an understandable tendency to over investigate*’ (3, p. 239) and burgeoning medical expenses. (1, 14) Moreover, even when life-threatening causes have been ruled out, patients diagnosed with NCCP typically do not feel relieved. Rather, given that the long-term course of NCCP is marked by chronic chest pain that significantly impairs functioning and reduces

... the integration of chiropractic in the broader allopathic interdisciplinary team seems worth a carefully designed empirical trial”



quality of life, (3, 5, 10, 15, 16) these patients continue to over-utilise the health care system. (7, 10, 17)

Numerous interacting biopsychosocial factors have been identified as potentially significant etiologically including gastrointestinal mechanisms such as GERD, oesophageal spasm and/ or gastrointestinal hypersensitivity, (18, 19, 20, 21, 22, 23, 24, 25) psychological influences such as panic and other anxiety disorders, (3, 11, 17, 26, 27, 28) musculoskeletal causes including pain referred from the cervical and/or thoracic spine, (12, 18, 29, 30, 31, 32, 33) and visceral pain hypersensitivity or hyperalgesia (also referred to as '*somatovisceral pseudo-referred pain*' and '*visceral mimicry*'). (9, 21, 22, 34, 35, 36, 37, 38)

Considering the widespread recognition that NCCP involves a complex dynamic of interrelated biopsychosocial influences, (1, 6) it is likely that no one provider, in isolation, has the expertise to fully evaluate and treat this condition. Accordingly, an evidence-based, multidisciplinary approach to assessment and management increasingly is being recommended (3, 15, 39) including a '*multidisciplinary chest pain clinic*' bringing numerous providers together to work collaboratively on the biopsychosocial assessment and management of chest pain. (3)

However, to date, calls for multi-disciplinarity generally have included consideration of only allopathic providers such as cardiologists, psychologists/ psychiatrists, and gastroenterologists. (3) Although proposed diagnostic models have included orthopedic evaluation, (15) neuromusculoskeletal (NMS) specialties typically receive short shrift in multidisciplinary algorithms, despite the fact that spinal examination has been identified as an integral part of routine chest pain assessment (33) and that musculoskeletal disorders often are involved, but under-recognised, in typical NCCP evaluations. (4, 31, 32)

Indeed, within the context of a fractious health delivery system, where a paucity of alternative and allopathic provider cross-referral standard practices or guidelines exist (40), pathways for inclusion of complementary and alternative (CAM) providers remain uncharted, despite the accumulating evidence base supporting, for instance, chiropractic approaches to neuromusculoskeletal conditions. (41)

In the absence of an evidence-based clinical prediction algorithm, the diagnosis and management of NCCP can be challenging. Although recent attempts to formulate diagnostic models (42) and stepped- care treatment approaches have been offered, (1, 2, 4, 6, 43, 44, 45) none to date has included chiropractic evaluation and possible intervention. Given the biopsychosocial nature of NCCP as discussed above, increased cooperation between allopathic providers and chiropractors holds promise for enhancing patient outcomes. (31)

Although slow to emerge, preliminary evidence increasingly supports the inclusion of chiropractic in broader multidisciplinary models. For instance, Christensen and colleagues (46) suggested that systematic manual palpation of the spine and thorax be used as part of the clinical examination supplementing the basic cardiological screen for chest pain patients and, in a non-randomised open prospective trial, found that chest pain patients may benefit from chiropractic manual therapy. (47). Likewise, Polkinghorn & Colloca (31) discussed the successful chiropractic treatment of NCCP involving adjustment of the costosternal joints. Hence, as Smith and colleagues (48) pointed out, there is a clear need to explore models for multidisciplinary coordination of care.

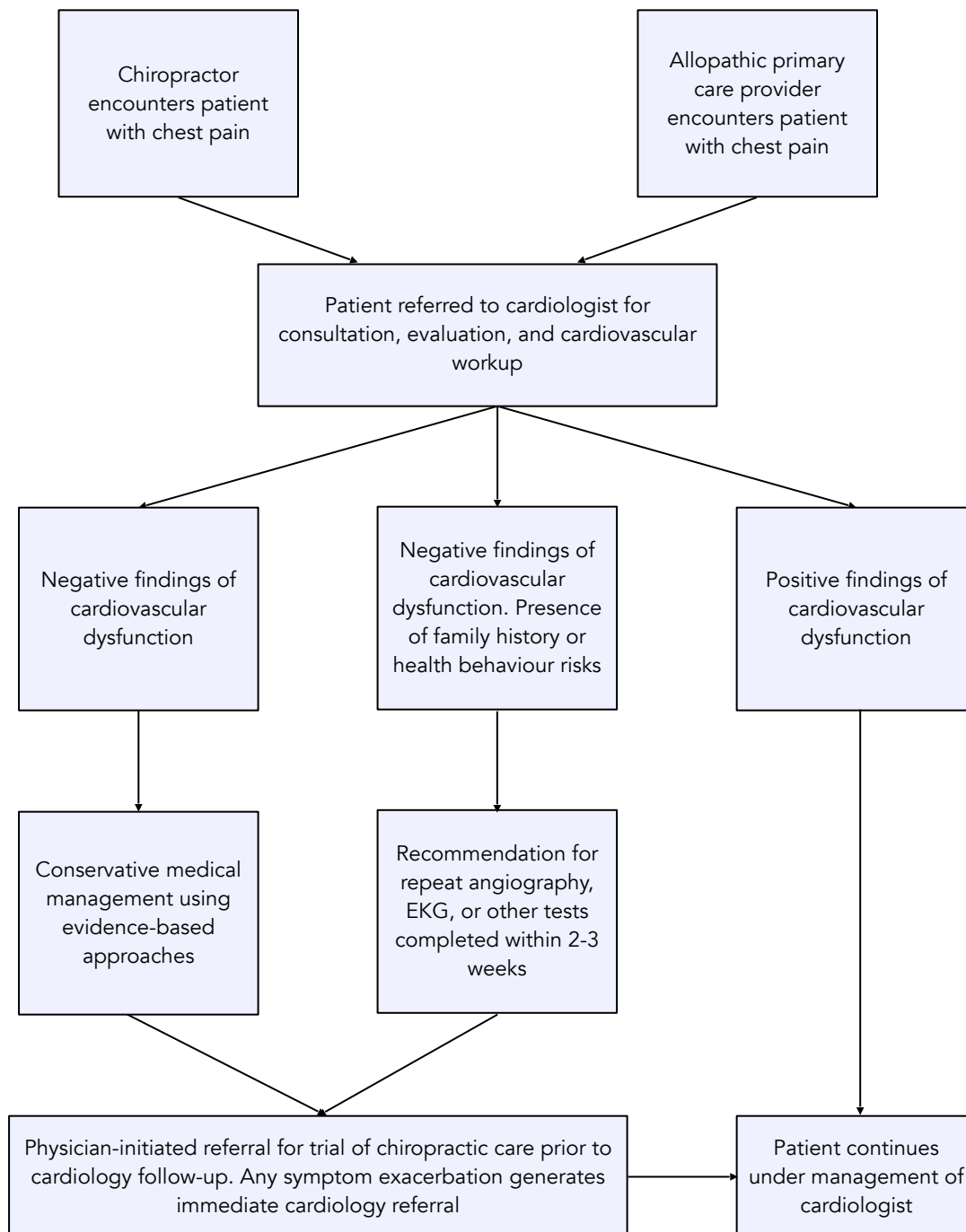
Accordingly, the purpose of the present paper is to propose a treatment algorithm for NCCP that could potentially improve interdisciplinary collaboration between allopathic and chiropractic practitioners, enhance patient outcomes, and reduce the financial burden of patient care, if validated by subsequent research.

### A Collaborative Model

Given the complex dynamic of biopsychosocial factors that give rise to chest pain complaints as well as the importance of NMS influences on NCCP, this relatively common disorder represents a unique opportunity for collaborations between chiropractors and allopathic providers.

As first step we present a a proposed algorithm for bridging the multidisciplinary gap, shown as Figure 1.

Figure 1: Collaborative Model for Allopathic – Chiropractic Management of NCCP



The model assumes standard of practice, evidence-based approaches to triaging chest pain complaints. Specifically, the first priority always is to identify cardiac and other potentially life-threatening causes of chest pain. However, after emergent care concerns have been ruled out, other factors should be explored including gastrointestinal mechanisms and psychiatric influences. As part of this evaluation, the algorithm (shown in Figure 1) proposes physician-initiated chiropractic referral, chiropractic evaluation of possible musculoskeletal involvement and, if indicated, a brief (e.g., one week) trial of chiropractic treatment, the outcomes of which could serve as a diagnostic to help differentially diagnose NCCP. A primary assumption of the proposed model is continuous

monitoring and contact with the cardiologist or other physician(s) coordinating patient care to assess any changes in pain or dysfunction. Hence, the algorithm proposes a contributing, but not exclusive, role for chiropractic marked by multidisciplinary collaboration and cooperation for the patient's benefit. In cases where cardiac disease is positively identified, the patient proceeds with standard of care medical interventions. Only in the case where cardiac and other life-threatening causes are ruled out and where the patient reports some improvement from the chiropractic treatment, does further chiropractic involvement continue with frequent status reports to the coordinating physician and timely (e.g., within 2-4 weeks) medical reevaluation. Of course, if patient symptoms worsen or redevelop during chiropractic treatment, immediate physician referral is triggered.

#### *An example*

To illustrate the model, consider the typical NCCP situation discussed in the literature (31, 49, 50) and seen by chiropractic clinicians:

A middle aged male patient presents for chiropractic care secondary to chest pain. Usually, the patient already has been assessed and followed by a cardiologist who has performed numerous screening tests, with all negative results. In the absence of pathognomonic findings, the patient commonly is released with no additional treatment recommendations or specific referral. With no diagnosis or explanation for the symptoms, the typical patient does not feel reassured. Some time later, when chest pain recurs (e.g., after outpatient office hours or on the weekend), the patient visits the emergency room and undergoes expensive and invasive cardiac re-screening. Once again, no cardiac or other life threatening problems are found and the patient is released, still with no diagnosis, and is told to revisit his cardiologist. At the next chest pain episode, the patient is re-evaluated by the cardiologist and medically screened yet again, with no significant results. Feeling dissatisfied, the patient seeks chiropractic care. On evaluation, the patient is diagnosed with an NMS dysfunction and is treated with manipulation, resulting in chest pain symptom remission.

This example lends itself to speculation that an earlier trial of chiropractic care, if successful, may have reduced the need for the repeated invasive and costly medical procedures or, at least, provided some information to inform subsequent assessment or referral strategies. Consistent with previous calls for multidisciplinary evaluation and management of chest pain complaints within the same clinic, (3) the integration of an NMS specialty like chiropractic in the broader allopathic interdisciplinary team seems worth an empirical trial. If carefully assessed outcomes support the cost-effectiveness of this approach, it may hold promise for enhancing patient care, reducing unnecessary health care expenditures, and serving as a model of collaborative care for other complex disorders.

#### **Discussion**

Despite a handful of preliminary studies examining the possible impact of chiropractic treatment on actual cardiac activity, (51, 52) research rarely has explored the possible benefits of chiropractic care on NCCP. As noted above, evidence clearly implicates visceral pain hypersensitivity/hyperalgesia and musculoskeletal factors in NCCP including dysfunction in the upper cervical spine, (50) lower cervical spine, (30, 49) and thoracic spine. (53) However, because visceral-related referred pain patterns tend not to discretely radiate to specific locations in the body, different areas of dysfunction may give rise to chest pain complaints. (54, 55, 56) Considering that musculoskeletal factors are among the most commonly implicated in NCCP, (32) the integration of an NMS specialty like chiropractic in the broader allopathic interdisciplinary team seems worth a carefully designed empirical trial. (57, 58)

## A role for SOT technique

Indeed, there is a pressing need for more empirically supported chiropractic research on NCCP. Although numerous chiropractic conceptual models have been advanced, few have been evidence based. For instance, among the various chiropractic approaches that have attempted to incorporate viscerosomatic and somatovisceral interrelationships, one of the best known is the *Sacro Occipital Technique* (SOT) system, which addresses the relationships between myofascial dysfunction and mimicry visceral dysfunction syndromes using a *Chiropractic manipulative reflex technique* (CMRT). (59) CMRT offers a framework for diagnosing and treating visceral referred pain as well as somatic biomechanical problems.

DeJarnette, the founder of SOT, postulated a relationship between unilateral sacroiliac joint dysfunction (hypermobility) and unilateral scalenus or 1st rib dysfunction (60, 61) and hypothesised that this clinical relationship was due to visual and vestibular righting (homeostatic) mechanisms, which attempt to return upright balance to human posture when faced with asymmetrical joint loading against gravitational forces. (62, 63) From this perspective, a patient's response to pelvic block placement in the supine position would be explained by the release of the myofascial kinematic chain compensatory stresses.

Following DeJarnette's CMRT theory, assessment and subsequent treatment of specific reflexes or other musculoskeletal structures, such as the left *scalenus* muscles, might further lower tension to an area perceived by a patient as '*angina-like*' chest pain. This pain might be successfully reduced with sacroiliac treatments combined with scalenus relaxation. Certainly gentle manipulation/mobilisation of the cervical and/or the thoracic spine as well as other myofascial techniques also would be recommended when treating this type of patient. Unfortunately, little empirical evidence has yet been generated for the SOT approach, notwithstanding testimonials and anecdotal reports.

## Conclusion

This paper has attempted to highlight the potential gap in delivering more effective patient care for NCCP and offered a collaborative algorithm based on practical, conceptual and patient-centered concepts. Bridging communication and collaboration between conventional and alternative practitioners holds promise for improving patient outcomes and perhaps minimising unnecessary, invasive, and financially expensive diagnostic procedures.

As discussed above, evidence on the biopsychosocial factors implicated in the aetiology of NCCP has stimulated the development of numerous proposals for the multidisciplinary evaluation and management of chest pain complaints. Yet, to date, none has included chiropractic, despite the fact that NMS factors commonly are involved in NCCP yet often under-recognised by allopathic providers. (4, 31, 32)

By contrast to the plethora of chest pain research in the biomedical and psychological literatures, few evidence based chiropractic studies have been published on the evaluation or management of NCCP. The chiropractic field has yet to recognise the opportunity to build on existing findings as a scaffold for advancing collaborative partnerships with their allopathic counterparts. Further NCCP research is needed to elaborate the cost effectiveness of chiropractic care and the mechanism(s) by which chiropractic approaches may achieve their effects. For instance, if chiropractic is shown to reliably improve NCCP complaints, it will be important to determine whether chiropractic care of somatic structures is affecting the soft tissue alone (34, 51) or is also helping to organise autonomic nervous system reflex responses. (64)

It is incumbent upon the chiropractic profession to build an evidence based model documenting the efficacy of chiropractic that helps to delineate when a trial of chiropractic care would be indicated for chest pain complaints. Other opportunities to demonstrate further effects of chiropractic care on organic functioning might potentially develop from these interdisciplinary collaborations.

In the presence of a fractious health delivery system that does not foster integration between conventional and alternative care providers, it is likely that many of the NMS factors involved in NCCP will continue to be under-appreciated and non-optimally managed.

To be an active participant in the modern healthcare marketplace, chiropractic must provide evidence-based cost-effective alternatives to the existing menu of options.

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Cite: Terre L, Blum CL. Non-cardiac Chest Pain: An interdisciplinary algorithm for clinical care. Asia-Pac Chiropr J. 2023;3.4 URL [apcj.net/papers-issue-3-4/#TerreNoncardiac](https://apcj.net/papers-issue-3-4/#TerreNoncardiac).

## About

Preliminary portions of this research were presented at the 13<sup>th</sup> Annual Conference of the Association of Chiropractic Colleges, the abstract of which was published in *The Journal of Chiropractic Education* (Blum et al. (2006), search: Angina visceral mimicry syndrome: A proposed collaborative treatment model. *The Journal of Chiropractic Education*, 20(1), 50-1).

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