

Review Article

The Kaleidoscope Model of Integrative Healthcare as a collaborative paradigm for cardiology and chiropractic: a call to action



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ABSTRACT

This review article proposes a model of integrative care for cardiovascular patients in institutional settings. We review relevant historic and contemporary examples of medical–chiropractic cooperation and a brief review of the literature illustrating the clinical benefits of chiropractic care for patients with cardiovascular disease. The groundwork proposes a distinct research and clinical practice model incorporating the doctor of chiropractic (D.C.) as a synergistic partner with the medical cardiologist coined the Kaleidoscope Model of Integrative Care (KM). While a traditional kaleidoscope does not alter the nature of light itself, the observer does see the ‘raw data’ of colors and shapes, wavelengths, etc. contained within the “potential” of the light itself; left unrecognized, even subtle re-orientations of the instrument changes the perspective. Similarly, the KM is intended as a conduit for slight reorientations to traditional medical–chiropractic–patient hierarchies, thus creating new treatment options and generating robust changes in inter-professional perception of the patient’s condition(s) and treatment options. It is hoped that this model will not only serve future patients within hospitals, but that institutions will serve as incubators for better collaboration and research among the majority of free-standing medical and chiropractic practices ultimately benefitting the patient with cardiovascular disease.

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1. Introduction

Heart disease is the leading cause of death in USA with total expenditures accounting for current treatments including healthcare services, financial costs and lost productivity estimated at upwards of \$200 billion dollars/year.^{1,2} While ongoing treatments currently involve lifestyle changes, medicines, medical/surgical procedures, and cardiac rehabilitation,³ this situation clearly calls for any plausible avenue providing improvement. Thus far, no format for collaborative guidelines and co-care with chiropractic and cardiology has been ascertained in an evidence-based medicine (EBM) environment with solid evidence and outcomes assessments to jointly improve upon a more effective treatment model of cardiovascular disease. The Kaleidoscope Model of Integrative Care (KM) places cardiologists and chiropractors within a cardiology division of a major teaching hospital by framing a systematic concept modeling side-by-side approaches for individualized treatment and prevention priorities.

2. Historical and contemporary models of medical–chiropractic collaboration

Although limited data have been available for such constructs, chiropractic institutions such as the Clear View Sanitarium of Davenport, Iowa integrated a conventional psychiatric assessment with chiropractic intervention as early as 1926⁴ by conducting initial patient evaluations and pharmaceutical interventions concurrently with daily chiropractic evaluation and adjustments administered as the primary intervention. The medical and ancillary employees maintained extensive records, but many were lost to the research community during the closing of the sanitarium in 1961 (though some research publications, however, were anthologized in a 1973 collection).⁵ Another long-standing example of inter-professional cooperation can be found in Louisville, Kentucky at the Kentuckiana Children's Center,^{6,7} a cooperative non-profit center maintaining operations for special needs children by providing chiropractic care in conjunction with nutritional evaluation, visual therapy, physical and occupational therapy, dental services, and special education with off-site medical/allied health professions since 1957, which has published a number of case studies and case series.^{8–11} The Spears Chiropractic Hospital of Denver, Colorado opened by Leo Spears, D.C. in 1943 differentiated itself from the specialized patient populations of Clear View and Kentuckiana by offering chiropractic care to the general patient population¹² while providing medical services through doctors of osteopathy despite intense opposition by medical interests in Colorado until the hospital's closing in 1984.

In more recent times, we periodically find research training opportunities in major venues such as the 1975 NINCDS (National Institute of Neurological and Communicative Disorders and Stroke) conference¹³ as beacons for shifts in integrative care. Several larger institutional studies involving multi-site multi-disciplinary settings have also found similar successes; one found more significant long-term benefit compared to existing hospital-based therapists¹⁴ while another

patient-assessed D.C./M.D./P.T. (physical therapy) study found their D.C.'s care as excellent resulting in improved spine care and promotion of care coordination resulting in reduced unnecessary testing, costs and procedures with standardization of low back pain (LBP) management.¹⁵

3. Viability for creating the Kaleidoscope approach

By modeling KM research within a training platform to encompass acute step-down, cardiac rehabilitation, recidivism, cost-effectiveness, and true prevention programs, a more contemporary understanding of chiropractic's interdisciplinary healthcare shows:

- Documented overall low safety risks with extremely low adverse incidents of chiropractic treatment^{16–22}; D.C.'s are accepted by Medicare as federally licensed and accredited primary portal-of-entry physicians while participating providers in most insurance programs and do not require referrals *ex lege*.
- Chiropractic, as a profession, consistently documents overall cost-effectiveness and high patient satisfaction^{23–27} while aligning with hospital goals as included in the American Hospital Association (AHA) Recommendations.²⁸
- The American Health Care Policy And Research (AHCPR), recognized as funding the development of “gold standard” clinical practice guidelines and the source of unbiased, science-based information on what works and does not work in healthcare,²⁹ found that accredited chiropractic curriculum standards met or exceeded comparable classroom hours in anatomy, physiology, rehabilitation, nutrition and public health compared to their M.D. counterparts.^{30,31}
- A federally licensed consensus document of accredited U.S. chiropractic college presidents from the Association of Chiropractic Colleges, a leadership organization of chiropractic educational programs in the U.S., Canada and endorsed by the World Federation of Chiropractic (WFC), a non-governmental international consulting body affiliated with the World Health Organization representing chiropractic to the international health care community³² strongly encourages relationships with other healthcare providers and various healthcare disciplines supporting student learning, research and evidence-based informed practice.³³
- While LBP (low back pain) is not a primary focus of cardiology, cardiac rehabilitation is relevant to inevitable step-down scenarios posed within KM settings. Large broad scope institutions such as the VA (Veterans Administration),³⁴ Cleveland Clinic,³⁵ the Osher Center for Integrative Medicine,³⁶ and the University of South Florida (USF)³⁷ successfully offer chiropractic intervention while both the Winchester Hospital³⁸ and Cancer Centers of America³⁹ offer an even more inclusive approach including chiropractic along with standard medical care.
- The National Committee for Quality Assurance (NCQA), an independent 501(c)(3) non-profit organization in the United States that works to improve healthcare quality through the administration of evidence-based standards, measures,

programs, and accreditation, certifies a “Medical Neighborhood” concept with chiropractic.^{40,41} Similarly, Winthrop Hospital⁴² at New York University currently provides an NCQA certified chiropractic collaboration program successfully coordinated with orthopedic surgery incorporating approximately 75 chiropractors.⁴³

Given this background and chiropractic’s role(s) relevant to cardiology (see below), a clinical cooperation within the cardiology division of a major teaching hospital would suggest plausibility, but would clinical cooperation be of benefit to patients with cardiovascular disease?

4. Defining the Kaleidoscope Model

Collaborative Models (CM’s) successfully employed in cardiology^{44,45} thus far remain comparatively hierarchical and repetitive. The KM seeks to distinguish itself from CM’s by contrasting sharply with typical academic pecking orders; by spearheading a *mutually accessible concentric model* between the D.C./M.D. with parity, patients have unique access to services providing concurrent benefits and challenges traditional hierarchical models through a distinct, *ad-hoc* research and practice model placing the doctor of chiropractic (D.C.) as a *synergistic co-provider* rather than as subordinates. Core concepts subsequently expressed through the KM are premised upon (1) prior interactions between the two professions communicating their differences in-depth, (2) ample opportunity through direct contact to find purposivism with research and (3) the two professions earnestly strive to extract all possible tools and benefits available leading toward meaningful results.

Since its conception, chiropractic has maintained a full-body concept; cardiovascular physiology relevant to the neural system is contained within its global model of healthcare. By designing concentric ad-hoc approaches, patients and providers allow individual treatments to be evaluated *in-momento* rather than pre-designed tiers—particularly as chiropractic has often been solely relegated to musculoskeletal arena when under the guise of “multi-disciplinary” care. Placing the approach under academic scrutiny, however, suggests some juggernauts:

1. *Information bias*: Authors recently concluded that few healthcare providers effectively facilitate patient involvement, suggesting that longer consultations might improve this situation.⁴⁶ Having the D.C. approach the consult and treatment concurrently with full authority is posited to minimize clinical and communication errors between providers before the preconceived notions are expressed.
2. *Patient omissions, misinterpretations, or devaluation of clinical information about pharmaceuticals/nutraceuticals*: In 2001, Eisenberg, et al had identified public confidence levels in CAM providers as comparable to M.D.’s, and nearly 80% of those responded found a combination of an M.D. and CAM to be superior, yet approximately 70% did not disclose at least one CAM procedure to a physician.⁴⁷ In a separate study, two patients’ medical omissions ultimately found statin-induced myopathy misdiagnosed by

the D.C. as mechanical musculoskeletal pain⁴⁸ resulting in unnecessary misperceptions about ineffective chiropractic treatment and confusion about the clinical direction for the patients.

3. *“Turf wars”* As recently as 2006, Greene, Smith, Allareddy, and Haas found that only 29% of Iowa primary care physicians surveyed had ever formally referred a patient to a doctor of chiropractic (despite Iowa lodging the oldest and one of the largest chiropractic universities in the country), and the majority preferred that patients contact chiropractors on their own without involving the medical doctor.⁴⁹ Similarly, physical therapy (a first line of intervention in cardiology rehabilitation) is also susceptible to this bias as a significant negative impact toward chiropractors by student physical therapists⁵⁰ may cause relationships to never even have an opportunity to interact.

To overcome such obstacles, pillars embedded in the KM infrastructure such as access, communication, skill, and ethics are indispensable to the primary purpose of successful implementation.

5. The basis of chiropractic to cardiovascular physiology

Several biologically plausible mechanisms exist by which the chiropractic adjustment may ameliorate arterial hypertension and connections between chiropractic and heart function. The vagus nerve exits the skull at the jugular foramen in close proximity to the atlanto-occipital joint; therefore, correction of atlanto-occipital subluxation (as defined in this context by chiropractic⁵¹) and/or cranial dysfunction may assist the body in regulating the heart’s parasympathetic tone and may disturb vagus innervation to the aortic and carotid baroreceptors. These preganglionic fibers synapse at the superior cervical, middle cervical, and stellate ganglia; therefore, correction of cervical and/or thoracic subluxation can help regulate the sympathetic tone of the heart and great vessels. Additionally, virtually all vessels (other than capillaries) receive sympathetic innervations to the smooth muscle within the tunica media. Sympathetic outflow is from the thoracolumbar region and synapses anywhere within the paravertebral chain (from the upper cervical spine to the coccyx). The regulation of vasomotor tone, in essence, can plausibly be threatened by chiropractic subluxation anywhere in the vertebral column.

A number of well-documented risk factors for myocardial infarction and stroke could plausibly be disrupted by disturbed tone related to chiropractic subluxation. Sacco et al concluded arterial hypertension is the single most important modifiable risk factor for stroke.⁵² The Framingham Study’s establishment of a definitive relationship between hypertension and stroke is now well-known.⁵³ The risk of stroke is increased 3–5 times with hypertension and could be as high as 8 times higher, depending on the severity of the hypertension.⁵⁴ Studies also show that treating hypertension lowers stroke risk. A meta-analysis by Lewington et al links arterial hypertension to death from myocardial infarction as well as stroke in middle and old age.⁵⁵ Chen et al found arterial hypertension to be an independent risk factor for death from myocardial

infarction, hypertension and prior stroke in survivors of previous myocardial infarction,⁵⁶ and Thune et al found that antecedent hypertension independently increased the risk of heart failure.⁵⁷

6. Clinical research in chiropractic and cardiovascular physiology

A number of clinical studies indicate that chiropractic adjustments can reduce systolic and diastolic blood pressure in patients with hypertension. Plaugher and Bachman published an instructive case study involving a 38-year-old man with a 14-year history of hypertension and visceral side-effects from the medication.⁵⁸ Chiropractic care centered on adjustments of mid-cervical, upper thoracic, and mid-thoracic vertebral subluxations. Medications were stepped down; at publication, the patient's blood pressure had stabilized at normal levels without medication and with abatement of all presenting symptoms. Connelly and Rasmussen presented a case series of hypertensive patients under chiropractic care,⁵⁹ exhibiting a substantial reduction in systolic and diastolic blood pressure along with reduced need for medication.

Beyond these case reports and case series, a number of clinical studies have been published. Six chiropractic students with blood pressures of at least 140/90 mm/Hg received chiropractic adjustments for correction of dysfunctional occipito-mastoid suture mechanics.⁶⁰ Four other hypertensive students were not adjusted. Post-adjustment, there was a mean decrease of 10 mm/Hg in the experimental subjects' systolic pressure, with no change in control and with statistical significance. In another pilot, 21 patients with hypertension were randomly assigned to active treatment, placebo treatment, and control groups.⁶¹ The active treatment subjects were adjusted to correct subluxated levels between T1 and T5. Both systolic and diastolic blood pressures were reduced after intervention to a statistically significant degree with no statistically significant change in the placebo or control groups. Win et al have also suggested that heart rate variability and blood pressure in patients with cervicalgia has different sympathetic/parasympathetic dominances depending on the spinal level being treated.⁶²

Recently, Bakris et al undertook an eight-week interdisciplinary study with the cooperation of the Pritzker School of Medicine, University of Chicago.⁶³ Both the setting and the fastidious protocol make this the most promising study of its type to date. This study included 50 patients with hypertension who were either taking no antihypertensive drugs or underwent a 2-week drug-free "washout" period. The subjects were randomly assigned to a treatment group or a control group. Subjects in the treatment group received atlas adjustments as indicated, while control subjects received a sham procedure. Investigators performing blood pressure measurements were blinded as to whether the patient belonged to the control or treatment group. At 8 weeks, the treatment group demonstrated a mean decrease in systolic blood pressure of 17 mmHg, compared to 3 mmHg for the control group. Diastolic blood pressure decreased a mean of 10 mmHg in the treatment group, compared to 2 mmHg for the controls. The difference between groups was statistically significant for

both systolic and diastolic blood pressure. Furthermore, the magnitude of the blood pressure improvement in the treatment group was similar to the results generally seen when two antihypertensive drugs are used simultaneously. None of the patients in the study were complaining of musculoskeletal pain at the time.

Hyperaldosteronism is a risk factor for arterial hypertension and heart failure,⁶⁴ and there is also robust interaction between respiratory and cardiovascular function. A study of 1270 men at the Veterans Administration Outpatient Clinic in Boston, Massachusetts found a statistically significant inverse correlation between forced vital capacity (FVC) at the initiation of the study and arterial hypertension at 10 years of follow-up.⁶⁵

Most importantly, chiropractic adjustments can positively impact on volumes and further reduce risk factors for future cardiovascular events. Several studies show that FVC and/or FEV-1 improve under chiropractic care,^{66–70} and there has been a correlation between both FVC and forced expiratory volume in one second (FEV-1) on the one hand and the risk of stroke on the other as well as impaired ventilatory function and stroke possibly sharing a common cause.⁷¹ Additionally, Waks et al found an association between abnormal heart rate variability (HRV) and sudden cardiac death in patients with end stage renal disease.⁷² HRV is often used to monitor the state of autonomic innervation to the heart. Apropos of the current discussion, there are several studies in which HRV improved under chiropractic care.^{73–77} These data suggest that chiropractic care can potentially improve the autonomic dysfunction resulting in heart failure, hypertension, and sudden cardiac death and that chiropractic care would be beneficial for patients with cardiovascular disease.

7. Proposal of implementation

To address these issues with the KM so that robust changes in inter-professional perception of the patient's condition and options for treatment are successful, the features expected to evolve in time will initially include several tenets:

1. *To the maximum degree possible, hospital rounds and patient consultations will involve both medical and chiropractic practitioners.* It is critically important that chiropractic not be seen strictly through the medical lens and equally important that conventional medicine not be seen strictly through the 'alternative' lens of chiropractic. In effect, the kaleidoscopic lens of the KM can be subtly rotated to compliment medical and/or chiropractic insights, thus embracing both disciplines simultaneously in rounds and consultations and helping synergistic partners for the patient's benefit.
2. *Medical and chiropractic practitioners will have frequent opportunities to observe each other's procedures.* This is essential to enhance synergy between the professions. Medical cardiologists are not expected to conduct a chiropractic examination and adjustment, but they should have an understanding of how this appears when performed by an expert practitioner. Likewise, chiropractic practitioners will never perform surgical or medical procedures, but their

Table 1 – The Rows and Columns Represent Possible Diagnoses Leading to Treatment Scenarios in-Memento, the Basis on Which Both Chiropractic and Medical Approaches can be Jointly Prioritized

Primary condition(s) is/are:	Compensatory condition(s):	That may reveal symptomatic:	And/or may reveal asymptomatic:
Symptomatic and may result in -----	With/without ... compensatory condition/s and	Primary/compensatory condition/s of -----	Primary/compensatory condition/s of -----
Asymptomatic and may result in -----	With/without ... compensatory condition/s and	Primary/compensatory condition/s of -----	Primary/compensatory condition/s of -----

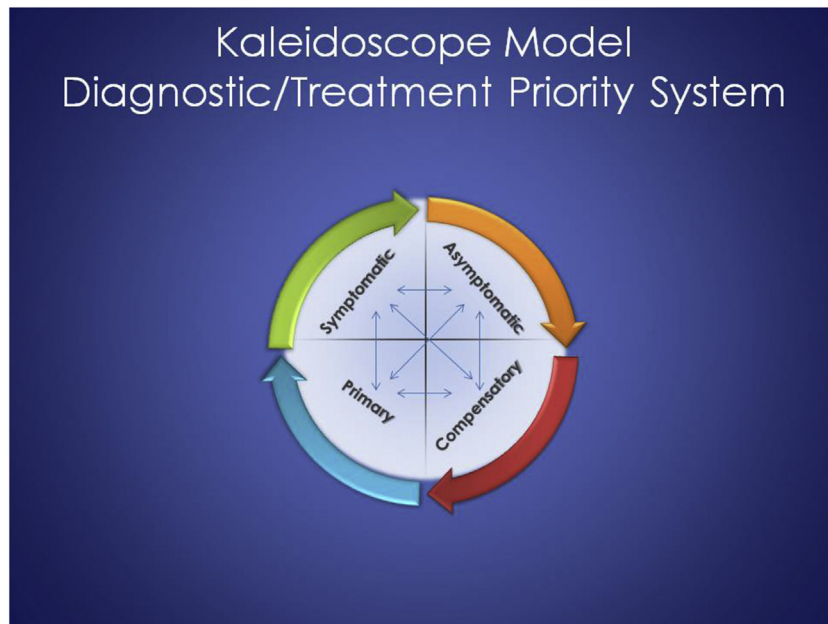


Fig. 1 – The figure visualizes the flow of interrelationships as described in Table 1 as a template to connect unique factors with arrows leading to individualized triaged diagnoses and treatments.

understanding of these should be sufficient to intelligently partner with their medical colleagues.

3. *Continuing education and training will involve both professions whenever practical.* Developments within one field will frequently broaden the perspective of practitioners of a different field. In addition, the host institution will undoubtedly develop continuing education programs for practitioners outside the institution who wish to learn about the clinical insights generated by the KM.
4. *Consistent with diligent medical oversight, the patient will determine the combinations of disciplines as applied to various stages of care.* Posit a patient, for example, with poorly controlled arterial hypertension in their current regimen. A trial of different anti-hypertensive drugs would be reasonable, as would a trial of chiropractic adjustments; similarly, a trial assessing recidivism due to acute myocardial infarction would also be well served. Historically, the two professions have very different perspectives on diagnosis and treatment. Utilizing the parameters of the KM (Table 1, Fig. 1), neither approach can be guaranteed to work or to fail; the two approaches have been explained by practitioners who understand each approach best. More so, the concepts of what symptoms may be primary or compensatory or whether an asymptomatic finding might be

accounted for allows both the provider and patient to rotate the “kaleidoscope” of intervention in one direction or the other to tailor each specific patient need ad-hoc. The larger arrows in the periphery represent those macro-concepts while the smaller arrows within the kaleidoscope represent the concept that each of those four macros can interact independently from the other to create a more detailed composite in the overall clinical picture. With each new individual ‘twist’ of the kaleidoscope, the researcher has a new fresh template describing unique findings and commonalities in their research without relying on preconceived notions.

5. *Medical and chiropractic practitioners will participate in developing research protocols.* The clinical experience of the KM providers plus the extant literature will undoubtedly suggest research questions. Such research promises to improve clinical outcomes and cost-effectiveness of patient care.
6. *The KM will initially operate within the cardiology division of a major teaching hospital.* A very small percentage of the world’s patients with cardiovascular disease will ever see the inside of the KM institution. If the insights developed within the KM model are ignored by the mainstream clinical community, the overall impact on society will

be minimal—notwithstanding the robust impact on the individual fortunate enough to come under KM care. By operating within the cardiology division of a major teaching hospital, the KM model will benefit from the cultural authority of that respected institution. Subsequently, the experiences are much more difficult for the mainstream clinical culture to ignore, thus serving the KM-incorporated institution as an incubator to inspire better collaboration among the majority of free-standing medical and chiropractic practices for the benefit of the patient with cardiovascular disease.

8. Conclusion

Exploring further research in a world-class environment addressing pain amelioration, cost reduction, clinical relevance(s) to cardiology, and other unforeseen benefits for cooperative care are the *raison d'être* for the KM's existence. In standardized hospital-based medical protocols, chiropractic's claims *beyond* musculoskeletal diagnosis and treatment in a first-person experience for cardiology affords examination, scrutiny and joint codification to take this model into the present and for future integration. Any multimodal or multidisciplinary research endeavor, of course, begins with the 'right questions' and requires effective communication and collaboration to achieve the best results. Perhaps the questions medicine has been asking regarding collaborative care have some self-fulfilling prophecies—particularly in light of scores of millions of patients finding benefit throughout chiropractic's history.

Prohibitive collaboration and *ad hominem* attacks—the antithesis of evidence-based models—squanders precious resources and diminishes credibility. Ostensibly, the hospital-based teaching environment—so critical for joint education and practice—deserves chiropractic as much as chiropractic for clarifying existing conflicts. Can a specific chiropractic technique therefore provide greater cardiovascular benefit compared to another? Perhaps ample clinical benefit did not manifest in research but other cost reductions appear at some level of acute/critical rehabilitative stage? The challenge saves both professions from needlessly squandering precious resources and ultimately benefits the public with answers rather than jargon.

Conflict of interest statement

The authors whose names are listed immediately below certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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