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Retrospective analysis of laboratory testing at the chiropractic clinic of Université du Québec à Trois-Rivières (UQTR)

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This study provides data based on the clinical experience of the Université du Québec à Trois-Rivières (UQTR) chiropractic clinic justifying the use of laboratory tests in chiropractic practice. The data was gathered retrospectively over a 51 month period from January 22, 1997 to April 10, 2001. During this period, the UQTR Chiropractic Clinic opened 6571 patient files. The analysis reveals that of the 6571 patients, 1200 (18.27%) underwent laboratory processes or tests. Of these 1200 processes or tests, 676 (56.34%) showed abnormal findings. Of the 676 patients with abnormal findings, 122 (18.05%) cases were serious enough to justify a referral to a medical doctor (general practitioner or specialist) for immediate follow-up. Among these serious conditions, one was a bone neoplastic pathology and one was a case of leukemia.

This study emphasizes the significant contribution of laboratory tests in chiropractic practice. Its importance rests not only with teaching purposes, but also rests with the proper assessment of clinical conditions frequently observed in chiropractic practice. Laboratory tests used in a proper context serve not only as a valuable instrument to identify primary and underlying abnormal physiological factors, but also assist the chiropractor in identifying more precisely those cases that require a medical referral. This study also demonstrates that laboratory testing of chiropractic patients is a necessary and essential clinical procedure for complete public protection. It also

La présente étude fournit des données cliniques sur l'expérience vécue à la clinique chiropratique de l'Université du Québec à Trois-Rivières (UQTR), en justifiant l'utilisation de tests de laboratoire pour l'exercice de la chiropratique. Les données ont été recueillies rétrospectivement sur une période de 51 mois, débutant le 22 janvier 1997 et se terminant le 10 avril 2001. Au cours de cette période, la clinique chiropratique de l'UQTR a ouvert 6571 dossiers de patients. Cette analyse révèle que des 6571 patients, 1200 (18,27%) ont passé des tests de laboratoire. De ces 1200 tests, 676 (56,34%) affichaient des résultats anormaux. De ce nombre, 122 (18,05%) cas étaient suffisamment sérieux pour être référés à un médecin (de médecine générale ou un spécialiste) pour un suivi immédiat. Chez les patients présentant des problèmes graves, un cas correspondait à une pathologie néoplasique osseuse et l'autre cas était une leucémie.

La présente étude met l'accent sur l'importante contribution des tests de laboratoire pour l'exercice de la chiropratique. Leur importance repose non seulement sur leurs objectifs pédagogiques mais également sur l'évaluation précise des conditions cliniques fréquemment observées dans la pratique chiropratique. Des tests de laboratoire, utilisés dans un contexte approprié, servent non seulement comme un instrument précieux pour repérer des facteurs physiologiques anormaux primaires ou sous-jacents mais ils aident le chiropraticien à identifier les cas qui doivent être référés à la médecine. L'étude démontre également que les tests de laboratoire chez les patients de chiropraticiens constituent une procédure clinique nécessaire et

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demonstrates that chiropractors are an essential part of the health team even when patients are under medical supervision.
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KEY WORDS: chiropractic, laboratory tests or testing, underlying conditions, university clinic data.

essentielle pour la protection du public. Ils illustrent de plus que les chiropraticiens jouent un rôle essentiel dans le système de la santé et ce, même quand les patients sont sous supervision médicale.
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MOTS CLÉS : chiropratique, test de laboratoires ou test, conditions sous-jacentes, données cliniques de l'université

Introduction

The purpose of this retrospective study was to identify and analyze the profile of laboratory test utilization by chiropractic clinicians and the resulting underlying pathologies that were detected in the clinical setting of a chiropractic academic institution, as well as to address the relevancy of laboratory testing in modern chiropractic practice.

Health profession laws and regulations require that primary contact health practitioners such as medical doctors (MD), dentists (DDS) and chiropractors (DC) examine their patients in order to establish a diagnosis and make appropriate treatment decisions. The Quebec Chiropractic Act was enacted in 1973. This act, together with the professional regulations that were adopted there upon, establish the chiropractor's statutory duty to diagnose. In fact, the regulations do not permit the chiropractor to accept a medical report and to neglect performing his/her own examinations. Doing so could bring disciplinary sanctions in cases of complications following treatment or complaints of malpractice. In Quebec, during the past 10 years, cases similar to the above-mentioned example have come before the Ordre des chiropraticiens du Québec (Québec chiropractic licensing board) and have lead to jurisprudence to that effect. In Quebec, the chiropractors' Code of Ethics[1] of the regulatory agency as well as the Chiropractor's Manual of the Quebec Chiropractic Association[2] provide that the chiropractor must search for underlying pathologies.

Laboratory testing procedures have been part of the training curriculum of chiropractors for many decades. Quebec chiropractors have regularly utilized laboratory tests until February 2005 in order to identify underlying pathologies, in addition to clinical and radio-diagnostic examinations. For this purpose, most chiropractors have referred their patients to private laboratory facilities whose services were born at the patients' own expense. As well, chiropractic academic institutions must include the knowledge of laboratory tests in their curriculum for purposes of accreditation. North American professional standards established by consensus also include laboratory testing as part of the mainstream chiropractic practice.[3,4]

Although the importance of laboratory tests in chiropractic practice has been stated previously,[3,4,5] no data is available about the utility of lab tests in chiropractic practice. The purpose of the present study is to provide data based on the clinical experience of the Université du Québec à Trois-Rivières (UQTR) over a 51 month period.

Study Method

The UQTR chiropractic clinic admits patients coming from a catchment area of about 200,000 inhabitants. Trois-Rivières is a regional town, which is less diversified in ethnicity than Toronto or Montreal. Patients consulting the UQTR clinic are largely Caucasians and are mostly aged between 15 and 75 years.

The UQTR chiropractic clinic is an academic clinic that includes laboratory testing as part of the chiropractic curriculum. The chiropractic interns (fourth and fifth years) must perform a number of laboratory activities in order to fulfill graduation requirements.[6] The Council of Chiropractic Education (Canada) which is the independent accrediting agency for chiropractic programs, has very clear accrediting criteria regarding clinical laboratory activities.

When being admitted at the UQTR Chiropractic Clinic, each patient signs a consent form stating that his or her case can be used for research purposes by the university. During the period from January 22, 1997 to April 10, 2001, the UQTR Chiropractic Clinic opened 6571 patient files. These archived files were carefully reviewed in order to establish the number and type of laboratory testing

procedures that were ordered and the number of abnormal values that were obtained from those tests. The request forms for laboratory tests include the reasons for testing and are co-signed by the chiropractic clinician and the senior intern. Upon receiving the laboratory results, if an abnormal value was detected, a report form was filled out by the chiropractic clinician and the intern indicating the interpretations of those results. In those cases of identification of a serious condition, the university biochemist would issue a special note to the intern to be discussed with the related chiropractic clinician. A reference letter was then given to the patient for a medical consultation. In most cases, if the abnormal results were not indicative of an emergency, a verbal report was given to the patient and a copy of the results was available upon request for medical consultation. When a medical follow-up was done, it was recorded in the patient's file.

Four senior interns were involved in extracting data readily available from the patient files in identified sections of the files. Since case history, diagnosis, associated laboratory tests and other clinical procedures are already consigned in specific sections in the file, the interns had to transpose the targeted information to the research information sheet. Once the information was collected, the author reviewed each file containing abnormal results. A file was rejected if the file summary did not include the proper patient identification number. Four files were discarded through that process (680 files selected minus 4 rejected, 676 files retained).

To ensure proper extraction of data, by the four senior interns, a step by step procedure was implemented. Firstly, they had to retrieve all files in which laboratory testing was ordered. This information was readily available in a specific section of the file. Secondly, all the abnormal and normal results were recorded. Thirdly, they had to record if the clinician requested those tests for screening or pathology investigation purposes. This information appeared in the clinician request form. Fourthly, they had to look at the case history section of the file and record if the patient stated that he or she was under regular medical supervision or not. All abnormal results were classified in three different categories as follows:

Category #1: 508 files (see Table 1)
Category #2: 72 files (see Table 2)
Category #3: 96 files (see Table 3)

Categories 1 and 2 (Tables 1 and 2) consist of results based on screening tests. Those in category one were derived from patients who were under regular medical supervision at the time of the first chiropractic consultation, while results in category 2 represent patients who were not under regular medical supervision.

Category 3 results are based on tests performed for diagnostic purposes in order to rule in/out specific conditions with which patients had presented.

Study Results

Tables 1, 2 and 3 correspond to the numbered categories. Their contents include the extracted results from the 676 patient files.

Table 1 includes 508 files out of 676 patients with abnormal results. These files included general health laboratory screening of patients admitted for chiropractic care at the UQTR Chiropractic Clinic showing abnormal laboratory test results which were not previously detected by their medical doctor, even though, they were under regular medical supervision. The number of organic conditions requiring immediate medical referral was 20 cases. The number of organic conditions directly referred by letter to a medical doctor was 26 cases. The number of abnormal results verbally transmitted to the patient was 462 cases. In terms of percentages, out of 508 total cases, 46 cases (9.05%) were directly referred to a medical doctor. The immediate medical referrals account for 4% which include a case of bone cancer.

Table 2 includes 72 files out of 676 patient files with abnormal results. These files included general health laboratory screening of patients admitted for chiropractic care at the UQTR Chiropractic Clinic, that were <u>not</u> under regular medical supervision and, whose laboratory test results revealed abnormalities. The number of organic conditions requiring immediate medical referral was 11 cases. The number of organic conditions directly referred by letter to a medical doctor was 32 cases. The number of abnormal results verbally transmitted to the patient was 29 cases. In terms of percentages, out of 72 cases, 43 cases (59.8%) were directly referred to a medical doctor. The immediate medical referrals account for 15%.

Table1 patients who were under regular medical supervision

ABNORMAL test results and conditions suggested thereof:	NIMR*	NMRL**	No. of Cases
Hyperlipidemia (hypercholesterolemia (high LDL) in majority and triglycerides)		3	422
Hypothyroidism		9	22
Low erythrocyte count (anemia)		2	12
Hyperglycemia (diabetes)		2	11
Hepatic disease	10		10
Infectious pathology	8		8
Abnormal serological findings indicative of renal dysfunction		3	4
Abnormal cortisol values		1	3
Positive test for pregnancy			3
Presence of C-reactive-protein		3	3
Rheumatoid arthritis			1
Gestational diabetes		1	1
Ankylosing spondylitis of spine			1
Chronic Fatigue Syndrome			1
Gilbert's Syndrome			1
Osteolytic disease	1		1
Paget's disease (bone type)		1	1
Pre-eclampsia	1		1
Thrombocytopenia		1	1
Gonorrhea (male)			1
	20	26	508

*NIMR = Number of immediate medical referrals
**NMRL = Number of medical referrals by letter
Conditions requiring immediate medical referral are shown in sans serif.
Abnormal values of tests which do not point to a specific pathology are shown in italic.

Abnormal values of tests which do not point to a specific pathology, have been shown *in italic* in Tables 1 and 2.

Table 3 includes 96 files out of 676 patient files where lab tests were utilized in the context of differential diagnosis. These files included specific symptoms profile laboratory testing of patients admitted for chiropractic care at the UQTR Chiropractic Clinic with a differential diagnosis of a suspected condition. Interns and clinicians used laboratory tests to complement the standard chiropractic examinations (static and dynamic spinal palpation, orthopedic and neurological testing, and radiology (static or/and stress films when indicated) to confirm the presence or absence of an associated condition. Out of 96 cases in this category, anticipated abnormal values were detected in the context of a differential diagnosis in 41 cases (42.7%). Normal values were obtained when abnormal values were anticipated in the differential diagnosis of 55 cases (57.3%).

The number of organic conditions requiring immediate medical referral was 10 cases. The number of organic conditions directly referred by letter to a medical doctor was 13 cases. The number of abnormal results verbally transmitted to the patient was 73 cases. In terms of percentage, out of 41 cases, 23 cases (56.1%) were directly referred to a medical doctor. The urgent immediate medical referrals account for 24.4%, (10 cases out of 41 cases) which includes a blood cancer.

Abnormal values of tests which do not point to a specific pathology, have been shown *in italic* in Table 3.

Table 2 patients who were not under regular medical supervision.

ABNORMAL test results and conditions suggested thereof:	NIMR*	NMRL**	No. of Cases
Abnormal thyroid function (hyperthyroidism/hypothyroidism)		11	18
Anemia		4	17
Hyperlipidemia (hypercholesteremia (LDL))		6	9
Renal pathology	7		7
Diabetes (adult type)		3	6
Infectious pathology	4		4
Abnormal ovarian function (LH and FSH)		4	3
Pregnancy test (positive)			2
Thrombocytopenia		2	2
Paget's disease (of bone) (alkaline phosphatase very high)		1	2
Abnormalities in neutrophils numbers (microscopic inspection)			1
Abnormal erythrocyte sedimentation rate		1	1
	11	32	72

*NIMR = Number of immediate medical referrals
**NMRL = Number of medical reference by letter
Conditions requiring immediate medical referral are shown in sans serif.
Abnormal values of tests which do not point to a specific pathology are shown in italic.

Table 4 constitutes a list of the 8 most prevalent abnormal values that were encountered in the combined 3 categories. Conditions were grouped in order to provide a broad overview of laboratory testing in chiropractic. Abnormal values were classified in a decreasing order of prevalence.

Discussion

This retrospective study presents data on the frequency of tests and on the conditions suggested by them and provides the justification for their use in chiropractic practice. The analysis revealed that 1200 patients out of a total of 6571 (18.27%) underwent laboratory testing over a 51 month period. Out of the 1200 patients, 676 (56.33%) showed abnormal findings. Of the 676 patients with abnormal findings, 122 (18.05%) cases were serious enough to justify an immediate referral to a medical doctor (general practitioner or specialist) for immediate follow-up. Among these serious conditions, one was a bone neoplastic pathology and one was a case of leukemia. Conditions requiring immediate medical referral are shown in Tables 1, 2, 3 in sans serif. Discussion of the appropriateness or the inadequacy of the choice of tests for the screening procedures in category 1 and 2, is beyond the scope of this paper.

Category 1 – Table 1

In Table 1, the data identified 4 organic conditions (OC) requiring immediate medical referral, which are pre-eclampsia indicators, infection, hepatic disease, osteolytic pathology. The significance of laboratory testing is clearly evident when one takes into consideration the life threatening osteolytic (cancer) condition that can be detected by laboratory testing ordered by a chiropractor. A bone cancer not previously detected before an adjustment of the spine could injure the patient needlessly and complicate further medical treatment. In the case of pre-eclampsia, early detection could spare the mother and her child serious complications in the near future.

In addition, Table 1 sets out the results suggestive of certain pathologies but also includes the number of abnormal values of tests (italics), which do not necessarily point to a specific pathology. The reason for such inclusion is based on clinical experience. For example a positive biochemical test may not be pathognomonic of a

Table 3 tests performed for diagnostic purposes in order to rule in/out specific conditions with which patients had presented.

ABNORMAL test results and conditions suggested thereof:	NIMR*	NMRL**	No. of Cases
Ankylosing Spondylitis (*HLA-B27*)		3	8
Systemic Arthritis (RA,PA,DISH (HLA-B8))		2	5
Renal disease	4		4
Abnormal platelet coagulation		1	4
Hepatic disease	3		3
Anemia		1	3
Abnormal thyroid function (*hyper and hypo*)			2
Infectious disease	2		2
Electrolyte imbalance		1	2
Abnormal prostate function (*PSA, acid phosphatase*)			1
Paget's disease (of bone)		1	1
Tropical disease (stool examination)		1	1
Possible neoplasm disease		1	1
Hyperparathyroidism		1	1
Mononucleosis		1	1
Hypoglycemia			1
Neoplastic process leading to leukemia	1		1
	10	13	41

*NIMR = Number of immediate medical referrals
**NMRL = Number of medical reference by letter
Conditions requiring immediate medical referral are shown in sans serif.
Abnormal values of tests which do not point to a specific pathology are shown in italic.

Table 4 8 most prevalent abnormalities in decreasing order

	%	No. of Cases
1--Hyperlipidemia (cholesterol and triglycerides)	63.77%	431
2--Laboratory values suggesting thyroid dysfunction	6.22%	42
3--Laboratory values suggestive of anemia	4.74%	32
4--Systemic Arthritis (RA,PA,DISH (HLA-B8))	2.59%	18
5--Hyperglycemia	2.52%	17
6--Laboratory values suggestive of renal disease	2.22%	15
7--Laboratory values suggestive of the presence of an infectious process	2.05%	14
8--Laboratory values suggestive of abnormal hepatic function	1.94%	13

specific condition but it may nevertheless alert the clinician of a developing problem.

Category 1 data raises the importance of not presuming that medical supervision, in itself, is a safe indication of normality. If chiropractic laboratory testing had not have been performed in these cases, what would have been the impact on the patient's health?

In retrospect, a medical doctor or a chiropractor should not rely exclusively on previous examinations of colleagues. On the contrary, it is the duty of any health practitioner to perform all necessary examinations, including laboratory tests on the patient, in order to make his/her own complete diagnosis. Adequate clinical examination information provides the proper insight to a more accurate diagnosis. Laboratory testing plays a significant role in this process. Laboratory tests are a part of the overall examination process of modern practice of most primary contact health practitioners including chiropractors. Since chiropractic care is all about neuromusculoskeletal conditions that can be influenced by organic conditions, these must be highlighted. This process provides the most efficient and safe protocol of care for public protection.

Category 2 – Table 2

Table 2 shows evidence of 2 organic conditions requiring immediate referral. They are infectious pathology and renal pathology. Also noted are abnormal thyroid function and anemia *(underlying pathologies)*, the most prevalent abnormal conditions in this table. Anemia could be the major source of headaches or could be concomitant with a NMS condition[7]. Without the use of laboratory tests, the clinician could have missed this contributing factor. For hyperthyroidism, NMS symptoms would resemble those of arthralgias. As for hypothyroidism, paresthesia (carpal tunnel syndrome, nocturnal paresthesia of the hands) would be the likely symptom. Failing to detect it initially would likely result in a chiropractic treatment that would fail to provide the level of recovery anticipated by the initial NMS prognosis.

The patients in Category 2 were not under medical supervision. Chiropractic laboratory analysis proved valuable as part of the primary contact clinical examination. There is no doubt as to the importance and value of this diagnostic procedure for a chiropractor and his/her patient especially with regards to life threatening conditions such as infectious pathology and renal pathology. The high percentage of immediate medical referrals in this category emphasizes the necessity of laboratory tests.

Category 3 – Table 3

Table 3 shows evidence of 4 organic conditions requiring immediate referral which are hepatic disease, renal disease, infectious disease, and neoplastic process. Out of 41 cases, 10 cases of abnormal organic conditions required immediate medical referral, 13 other abnormal organic conditions had results communicated by letter to medical doctors and the 18 remaining cases had their results communicated verbally to the patient.

In this category, the chiropractic clinician and the clinical intern had targeted certain potential biochemical abnormalities with corresponding underlying pathologies, in the differential diagnosis process, in conjunction with clinical examination or re-examination procedures. In this table, more importance is given to the confirmation of a suspected condition such as hepatic disease, renal disease, infectious disease, and leukemia.

Under the circumstances of this study, 42.7% of the tests ordered for the purpose of confirming a diagnosis yielded positive results.

Table 4

In Table 4, the 8 most prevalent abnormalities identified are listed in decreasing percentage. Hyperlipidemia and especially cholesterol show the highest percentage at 63.77%. Abnormal cholesterol (LDL) and triglycerides levels should be noted since it is associated with atheromatous disease. The presence of hyperlipidemia should be ascertained since manipulation/adjustment of the cervical vertebral joints may put some demand on the cervical arterial system and possibly dislodge atheromatous plaques in very rare occasions. On the other hand, plaque formation may reduce normal blood flow in the arterial system affecting tissues related to NMS conditions. This is important information when evaluating the prognosis of the chiropractic treatment protocol. While hyperlipidemia was associated with the highest percentage (63.77%) of abnormal results, it was not translated into important referrals to medical doctors. The main reason for this lies in the context of predicting values and the specificity of these tests in conjunction with the general condition of the patient and the association of more than one abnormal test. When considering referring a patient because of

strong concern for his/her well-being, the clinician must make sure that he/she is not only dealing with abnormal cholesterol values but also with triglyceride values. Doing otherwise would make these abnormal results meaningless, in terms of differential diagnosis.

Conclusion

This study provides a general overview of cases where laboratory testing was proven to be relevant, and represents the initial step for further chiropractic and medical studies of the impact of laboratory testing on the general health of the patient. This study emphasizes the significant contribution of laboratory tests in chiropractic practice. Its importance rests not only with teaching purposes, but also rests with the proper assessment of clinical conditions frequently observed in chiropractic practice. Laboratory tests used in a proper context serve not only as a valuable instrument to identify primary and underlying abnormal physiological factors, but also assist the chiropractor in identifying more precisely those cases that require a medical referral. This study also demonstrates that laboratory testing of chiropractic patients is a necessary and essential clinical procedure for complete public protection and patient safety. It also implies that chiropractors are an essential part of the health team even when patients are under medical supervision. In considering laboratory testing as a diagnostic tool, chiropractors should be able to readily access laboratory facilities (private or public) to ensure better protection of public health.

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