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Short Communication

The Use of an Internet "Expert System" to Improve Income for an Orthopedic Surgeon

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For most orthopedic surgeons, evaluating chronic pain patients is often time-consuming and frustrating. There are many complicating factors, since often legal issues cloud the evaluation, and medication can become a problem as well, for both the physician and patient. Therefore, a tested evaluation method, from leading hospitals in the country, could prove helpful.

Researchers from Johns Hopkins Hospital and Cornell University have published information which reports:

- Chronic pain patients are misdiagnosed between 40%-80% of the time [1-5]. Our research shows that 50%-63% require surgery to improve, but have been misdiagnosed as having sprains and strains, or whiplash [1,2,5]. Additionally 71%-80% of patients told that they have Complex Regional Pain Syndrome (CRPS), or Reflex Sympathetic Dystrophy (RSD) which would require sympathectomies, really have nerve entrapment, which responded to peripheral nerve decompression [3,4].
- The two leading causes of misdiagnosis, according to a Wall Street Journal article are 1) doctors do not spend enough time with patients taking a careful history 56% of the time and 2) doctors order the wrong diagnostic test 57% of the time [6].
- There are at least 4 "wrong" diagnostic tests. Provocative discograms detect internal disc disruption missed by MRIs 76%-79% of the time [7]. 3D-CTs detect lesions in the bone missed by regular CT 56% of the time [8]. EMG/Nerve conduction velocity studies miss sensory nerve damage compared to current perception threshold testing. But the most egregious example of incorrect testing is the misuse of X-rays. We found that 98% of patients have worse pain leaning forward or backward, but virtually none of these patients have flexion-extension X-rays, which is just the logical way to test a patient whose has worse pain leaning forward or backwards.
- Of the patients told they have sprains and strains, 50%-63% of them require surgery to improve [1,2,5].

As an example, Donlin Long, MD, PhD, former chairman of neurosurgery at Johns Hopkins Hospital, and his colleagues had 70 patients referred to them because of neck pain and headache. These patients had normal MRI, CT and X-rays, and had been told by the referring doctors that nothing could be done to help their pain. They were "diagnosed" with whiplash, or chronic cervical sprain or strain. When these patients were seen by the physicians at Johns Hopkins Hospital and received evaluation with an Internet based expert system, which has a 96% correlation with diagnoses of Johns Hopkins Hospital doctors, the patients were diagnosed properly. As the result of these diagnoses, 98% of the patients were recommended to have facet blocks, root blocks, 3D-CT, flexion-extension X-rays and provocative discograms. The results of these tests indicated that 63% of these patients needed surgery. After surgery, 93% of the patients have good to excellent improvement [5].

Physicians have long realized the value of a careful and complete history [9,10]. Unfortunately, there are several factors which severely limit obtaining an accurate and thorough history. Physicians seem to be a large part of the problem. One study looked at history taking techniques of physicians. After a physician entered the room, patients were able to speak, an average of 12 seconds, before being interrupted by the physician, even before the patients had finished speaking. Physicians interrupted patients at least twice during a visit. The time the doctor spent with the patient averaged 11 minutes, but the patient only spoke for about 4 minutes of the 11 minutes [11]. The leading cause for interruptions was computer use, followed by beepers, then verbal interruptions, or someone knocking on the door. These interruptions, plus others, interfered with communication. The more frequent the interruptions the less favorable was the patient perceptions of the office visit. Male physicians interrupted their patients more often than female physicians. Female patients were interrupted more often than male patients,

by both male and female physicians. The patients who were interrupted most often felt they should have had an opportunity to speak more than they did [11]. Another study confirmed the truncated time physicians spend with patients. The average face-to-face patient care time measured by direct observation in this recent study was 10.7 minutes. When researcher evaluated the time spent on "visit-specific "work outside the examination room and combined it with face-to-face time, the average time per patient visit was 13.3 minutes [12].

So ideally, a physician would look for a method of obtaining a thorough history, without interruption of the patient, in a language the patient could understand, with high inter-rater reliability, which would not take any physician time to obtain, is cheaper than one on one training, and produced an accurate diagnosis with a very high correlation with diagnoses of expert physicians. This led to the development of the "expert system."

Some authors feel only limited progress has been made in expert systems [13]. Engelbrecht feels that the quality of knowledge used to create the system, and the availability of correct patient data are the two main problems confronting any developer of an expert system, and advocates an electronic medical record system to correct one component of the problem [14]. Babic concurs with the value of the longitudinal collection of clinical data, and data mining to develop expert systems [15].

The accuracy of any computer scored and interpreted expert systems are a major issue. One of the major sources of error seems to be the use of Boolean in programming the expert system. Boolean logic is the classic computer programming method, based on the internal mechanism of computers. problem with Boolean logic, and the use of branching diagrams, is the inability to consider more than one cause for the single problem. Clearly, there can be more than one cause for any medical symptom. Boolean logic allows the physician to examine only one potential cause at a time, and offers an either/or choice.

On the other hand, Bayesian logic is experiential. This is the logic that physicians use in everyday problem-solving. The best explanation for this is found in a very thoughtful work entitled "What is Bayesian statistics and why everything else is wrong" authored by Michael Lavine, from Duke University in Durham, North Carolina [16]. He has written a series of articles on how to think about problem solving [17,18]. Therefore, it makes sense to program an expert system using Bayesian logic. Bayesian logic requires using extensive data to determine the actual frequency of an event occurring.

If you compare the logic between Boolean logic, and Bayesian logic, you see that Michael Lavine chose the title for his article quite well-"What is Bayesian statistics and why everything else is wrong."

Another issue in creating an expert system is to be certain that the data being evaluated is accurate. Without the control for accuracy, any expert system creates a classic case of GIGO…"garbage in – garbage out.

To combat the poor history taking techniques demonstrated by most physicians, a team of physicians from Johns Hopkins Hospital developed an Internet based questionnaire, which duplicates a physician taking a careful and thorough history. The questionnaire consists of 72 questions, with 2008 possible answers, which takes 45 - 60 minutes for a patient to complete. The questionnaire, called The Pain Diagnostic Test, which is available in either English or Spanish, asks all the questions a competent and concerned physician would ask, if the physician spent an hour taking a careful history. With only 15 minutes of training, any medical staff member can be trained to access the Internet and get on to the www.MarylandClinicalDiagnostics.com or www.DiagnoseThePains.com websites. Once the website is accessed, it takes only 5 minutes of staff time for the staff member to set up a patient to take the test. When the patient finishes the Diagnostic Paradigm, the answers to the questions are scored, using Bayesian logic programmed in a propriety scoring algorithm. Then, within five minutes of the completion of the Diagnostic Paradigm, diagnoses are generated, based on the answers to the questions. These diagnoses have a 96% correlation with diagnoses of Johns Hopkins Hospital doctors [19].Then, based on the correct diagnosis, the Treatment Algorithm recommends the correct test to use, which are the tests used at Johns Hopkins Hospital, and other academic institutions, although often not in common use [5]. Additionally, Alessandro Landi, MD, professor of neurosurgery at University of Rome, reported that the Diagnostic Paradigm and Treatment Algorithm could predict, with 100% accuracy, intra-operative findings [20]. The efficacy of these techniques has been documented by the improved outcomes of patients, with 45% reduction of doctor visits and an 89% reduction in the use of narcotics [21].

The best measure of the efficacy of an expert system are outcome studies. This is the ultimate "evidence-based medicine. " It is real "proof of concept." The expert system which a physician chooses to utilize should have valid and replicable outcome studies published in peer reviewed medical journals. as well as outcome studies documenting consistent patient improvement after they have properly diagnosed and correctly tested and treating by following the recommendations of the Diagnostic Paradigm and Treatment Algorithm [21-23]. These tests are available at www.

MarylandClinicalDiagnostics.com, or at www.DiagnoseThePains.com. These tests can increase income, and improve patient care, in a number of ways.

1. The Treatment Algorithm will recommend that a physician perform peripheral nerve blocks, facet blocks, root blocks, and provocative discograms 192% more frequently than they do now (Das email-see appendix A).
2. The number of patients who will require surgery will increase 50% - 63% [1,2,5].
3. Using the tests will allow a physician to evaluate a patient in 5 minutes instead of the normal 15 - 20 minutes, so he or she can see more patients in a day.
4. Use CPT codes to receive payments for the tests themselves. The Medicare payment varies from $127 to $176.
5. Reduce inter-rater reliability issues between physicians in a group practice.
6. Improve patient care, as documented by published outcome studies and over 1,000 unsolicited letters from physicians, patients and attorneys reporting improvement. This is one of the few substantiated instances of "third party validation" of a technique. These are people who benefited from the technique. Their physicians or their attorneys reporting improvement, not just the physician self-reporting improvement.

Neurosurgeons and orthopedic surgeons using the tests report significant income, of at least 25% a year, from the same group of patients they currently see. They also report better patient satisfaction, and improved outcome. While no "expert system" is a panacea for the many problems confronting a physician, these systems offer a good framework for evaluations.

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Appendix A

Dear Dr. Nelson,

Your lectures at the ICRAPAIN conference in Kolkata were excellent. From the 550 physicians from around the world who attended, you received the highest rankings for your lectures. I am so pleased that your incorporated this lecture material in your new book. This will be very valuable to any physician. May we publish your lecture in Journal on Recent Advances in Pain, where I am editor in chief?

We have found that The Diagnostic Paradigm from www.MarylandClinicalDiagnostics.com has provided excellent medical information. This test has allowed us to increase the number of interventional procedures we do by 192% compared to our previous levels, with increased benefits to patients. Thank you for introducing this program to us.

I look forward to receiving your permission to publish your lecture.

Regards,
Gautam Das
Editor-in-Chief: Journal on Recent Advances in Pain
Director: Daradia-The Pain Clinic
Course Director: Aesculap Academy Pain Management courses
Author of books: 'Clinical Methods in Pain Medicine-2nd Ed'; 'How to start and run a pain clinic'; 'Basics of Pain Management' and 'Common pain management procedures'
Ex-Chairman: World Institute of Pain- India, Iran, Pakistan and Sri Lanka section.