Evidence Based Clinical Diagnosis: A Multimedia Summer Project

Justine Spencer[a], BSc; Sarah Campos[a], BSc; Andrew Jeffery[b], BSc; Katelyn Sorenson[b], BSc; Brian Buchan[c], BSc

[a]Island Medical Program 2015, Faculty of Medicine, University of British Columbia, Vancouver, BC
[b]Island Medical Program 2014, Faculty of Medicine, University of British Columbia, Vancouver, BC
[c]Island Medical Program 2013, Faculty of Medicine, University of British Columbia, Vancouver, BC

ABSTRACT

Five Island Medical Program students from across three years collaborated with local physicians on a UBC Summer Student Internship Project about evidence–based clinical diagnosis. This is the use of manoeuvres that have been objectively proven to increase or decrease the likelihood that a patient has a given disease, a topic on which we created short educational clinical skills videos. The videos use the examples of appendicitis and congestive heart failure to explain how using evidence–based clinical diagnosis can be easy and effective. Our experiences led us to reflect on the current clinical teaching in contemporary medical education. It is our opinion that this important area is on the verge of becoming mainstream in medical education.

KEYWORDS: *summer, evidence, physical, videos, diagnosis*

The objective of our Summer Student Internship Project (SSIP) was to create educational videos that demonstrated the practice of evidence–based clinical diagnosis. What exactly is evidence–based clinical diagnosis, and why do we not hear more about it in medical school? While we do not have an answer for the latter at present, we can do our best to answer the former in the course of this paper. Evidence–based clinical diagnosis is the use of manoeuvres that have been objectively proven to increase or decrease the likelihood that a patient has a given disease. It attempts to reconcile the gap between traditional physical techniques and more technologically based tests by emphasizing only those manoeuvres that have been shown to rule in or out a particular condition.[1]

We believe that while the assessment of physical signs cannot always compete with the accuracy of diagnostic imaging or the quantitative precision of laboratory investigations, physical examination remains a cornerstone of modern medicine. In the age of evidence–based medicine, more of the vast body of accumulated scientific knowledge can be incorporated into the modern clinical exam. Despite this, the physical exam that is currently taught in contemporary medical schools is largely tradition–based. For example, the extensive cardiovascular exam that first–year UBC medical students are taught includes testing for edema as a sign of congestive heart failure (CHF). Evidence–based research shows that the negative likelihood ratio for this test is between 0.39 and 1.1, making it diagnostically useless.[2] The use of the evidence–based physical exam and clinical diagnosis may help to address this discrepancy between the science and the clinical exams taught to medical students.

Evidence–based clinical diagnosis aims to marry the traditional with the contemporary by enabling clinicians to examine patients and formulate diagnoses more confidently and accurately.[1] It does this by examining and quantifying the relative usefulness of traditional examination manoeuvres in determining the presence or absence of a particular disease state, and by making recommendations about which examinations are most likely to prove or disprove a given diagnosis.[2] Recognizing this simple but powerful premise, we put the principles of evidence–based clinical diagnoses into action by creating educational videos demonstrating their utility with two common conditions: appendicitis and CHF.

Similar to the clinical skills videos used in the existing undergraduate curriculum, each of our videos demonstrates physical manoeuvres used when attempting to diagnosis a particular condition. Unlike many traditional physical exam techniques, however, each manoeuvre demonstrated in our videos is one that can reliably rule in or rule out the diagnosis in question. For example, in the video entitled "Does this patient have congestive heart failure?" a patient presents with dyspnea to the emergency room. The pre–test probability of heart failure for a patient presenting with shortness of breath is approximately 50%. With a positive abdominojugular reflux test, which has a likelihood ratio of approximately 8.0, the post–test probability of this patient having heart failure rises to 90%.[2] With only one manoeuvre, the clinical examination has significantly increased the suspicion that a particular disease is present and subsequently guides investigations and treatment more effectively.

Correspondence
Justine Spencer, justinespencer5@gmail.com

> The objective of our Summer Student Internship Project (SSIP) was to create educational videos that demonstrated the practice of evidence based clinical diagnosis.

Similarly, in our video entitled "Does this patient have appendicitis?" evidence–based clinical diagnostic principles are applied to demonstrate their usefulness. Appendicitis has a baseline prevalence of 25% in an adult population. This is the pre–test probability. With a positive result for tenderness at McBurney's point, which has a likelihood ratio of 3.4, the chance that the patient has appendicitis is now 53%. This is the post–test probability.[2] In this scenario, the clinical exam is used in such a way to guide treatment with more efficiency. This demonstrates the power of using evidence–based physical examination; ultimately these types of manoeuvres may spare patients unnecessary or invasive procedures while promoting more cost-effective clinical practices in the setting of finite healthcare resources.[3]

Exploring these topics in the course of this SSIP project allowed us to accumulate valuable clinical knowledge while developing practical new skills. Evidence–based clinical diagnosis has been helpful for us as students, as we can apply the science we have learned in order to make clinical diagnoses we can feel more confident about. An additional benefit of producing these clinical videos was exposure to the art and science of film-making. We researched, developed and edited a script that was subsequently professionally developed into a collection of short educational videos. We found this to be a creative and enjoyable process that opened our eyes to the many ways multimedia can be used in the undergraduate medical curriculum. This process also emphasized the value of having a diverse skill set in any clinician's practice.

In summary, evidence–based clinical diagnosis is a topic that we believe all physicians–in–training should be exposed to while developing expertise and fluency with the foundational skills of performing physical examinations. We hope that the concepts outlined in this paper as well as the videos produced by this project will spark interest and discussion among our peers and colleagues. The videos will be available to UBC medical students on the Medicine and Dentistry Integrated Curriculum On-Line (MEDICOL) website for viewing. We look forward to expanding our knowledge of this important area in our future training, and we are hopeful that similar content may be considered for incorporation into the upcoming UBC medical curriculum renewal.

REFERENCES

1. McGee S. Evidence based physical diagnosis. 2nd ed. St. Louis: Saunders Elsevier; 2007.
2. Simel DL, Rennie D. The rational clinical examination: evidence–based clinical diagnosis. New York: McGraw Hill; 2009.
3. Simel DL, Rennie D. The clinical examination: an agenda to make it more rational. JAMA. 1997;277(7):572-574.

Non-invasive Prenatal Diagnosis – A New Era

Shifana Lalani[a], BSc, MSc; William Lau[a], BPharm

[a]Vancouver Fraser Medical Program 2013, Faculty of Medicine, University of British Columbia, Vancouver, BC

ABSTRACT

Recent advancements in genetics have changed the field of non–invasive prenatal diagnosis (NIPD). Since cell–free fetal DNA (cffDNA) was detected in maternal plasma in the 1990s, researchers have been trying to enhance detection and quantification techniques in order to utilize this DNA in early prenatal diagnosis. As technology advances, there are a number of concerns requiring discussion, including ethical considerations of non–invasive prenatal testing, commercial utilization, and implementation into prenatal screening protocols. This commentary introduces cffDNA, the techniques used for detection, and ethical considerations for the future.

KEYWORDS: *non-invasive prenatal diagnosis, cell-free fetal DNA, chromosomal aneuploidy, genetic screening*

Prenatal diagnostic testing has been available in Canada for years. In British Columbia, it involves non–invasive blood tests during the first and second trimesters that measure hormones in maternal blood indicative of chromosomal abnormalities in the fetus.[1] Further non–invasive screening includes measuring nuchal translucency (fetal nuchal fold thickness) on ultrasound. These results along with ethnicity and maternal age are used to calculate an individual's risk of having a child with Down syndrome, trisomy 18, or open neural tube defects with a cut–off at 1:300 in Canada.[1] Subsequently, definitive prenatal diagnosis depends on fetal karyotyping or DNA analysis through invasive techniques such as chorionic villi