MEDICAL REVIEW

Birth, Death, and Resurrection of the Physical Examination: Clinical and Academic Perspectives on Bedside Diagnosis

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The physical examination has a historically prominent role in medical practice, being an important tool in diagnosis and in developing rapport with patients. Yet, physicians have lost bedside skills in recent years, with increasing use of technology at the expense of time spent with the patient. This is concerning, especially in the present era of cost-containment in health care. Approaches to improve bedside diagnosis skills include increased emphasis on instruction in physical examination during medical school and postgraduate training, and careful scrutiny of physical examination techniques, with formal evaluation of their accuracy and reproducibility. Only through education and research will the physical examination recover its central role in the clinical encounter.

INTRODUCTION

The physical examination remains a physician’s trademark. Practicing physicians acknowledge bedside skills as their most important tool [1], especially as an important instrument to build rapport between the patient and the physician [2, 3]. Likewise, patients continue to expect to be examined even in this era of increasing use of diagnostic technology [4]. However, compelling evidence shows that bedside diagnostic skills have been less effectively taught [1], and thereby progressively lost by physicians in this country [5-11]. This becomes of particular significance in the context of cost-containment that has been generated by the ongoing health care reform, since astute history and physical examinations are able to provide correct diagnoses in general medical practices in over 80 percent of cases without resorting to any complementary diagnostic investigations [12, 13].

The reasons for the loss of physical diagnosis skills are multiple. The advent of modern diagnostic technologies has made medical students not only less reliant on their bedside skills, but also has demanded that a greater part of their time be spent learning about these technologies [14]. In addition, the structure for the teaching and evaluation of physical diagnosis — once a sacrosanct component of medical education — seems to have lost uniformity among medical schools [8]. Likewise, all too often bedside diagnosis is inadequately
stressed during residency, and relatively few Internal Medicine and Family Practice programs have formal curricula for its teaching [15]. Accordingly, attending rounds are now frequently held in the confines of the conference room [15, 16]. The reality then is that students and residents lack physical diagnosis skills, and there is little to suggest that these will ever be acquired after formal training is completed and physicians enter clinical practice [5, 11].

Thankfully, there has been a resurgence of interest in improving the quality of bedside diagnosis in clinical practice. Many efforts have been launched to revive this art, as well as to make it a science [17-21], and it seems appropriate that we continuously examine this fundamental issue in medical education. The purpose of this article is two-fold: to review the use of bedside diagnosis from a historical perspective; and to evaluate possible interventions that could result in improved teaching and use of the physical examination in today’s medicine.

THE RISE AND FALL OF BEDSIDE DIAGNOSIS

The physical exam has been a part of medicine since ancient days. Egyptian, Babylonian, Chinese and Indian civilizations practiced examination of different parts of the body, especially inspection of the patient and palpation of the pulse. Unfortunately, limited knowledge is available about these practices, and the meaning applied to their findings may have been different to those of modern medicine. It was under the auspices of ancient Greek medicine, however, that clinical reasoning and adaptation of bedside diagnosis took a more familiar form, likely fostered by the abandonment of previously reigning magical-demoniacal concepts of illness and acquisition of a more rigid clinical method [22, 23]. Physicians of Hippocratic times made use of inspection, subjective measurement of body temperature, evaluation of the pulse, direct auscultation of the lung and abdomen, and palpation of the abdomen [22-25]. Examination of bodily secretions also prevailed at that time, and included not only visual but also olfactory and gustatory components (urine, sputum, sweat, cerumen) [23, 25]. Overall, Hippocratic physicians conducted a careful clinical encounter, but their incomplete understanding of clinico-pathologic correlations limited the use of physical diagnosis in the broader sense it carries today.

Stagnation followed Galenic times. Post-Galenic physicians throughout medieval times were diverted from the physical examination [14]. In truth, the entire concept of the patient-physician relationships was transformed. Uroscopy had become the symbol of diagnostic medicine, undermining the importance of the clinical encounter. In this sense, practices such as “postal diagnosis,” whereby a courier delivering a urine sample to be examined by a distant physician, became commonplace, to remain in use until the 1700s [14, 24]. This deviation from the importance of the clinical encounter, coupled with arguable societal requirements of modesty resulted in an almost complete involution of the physical exam for over 1500 years.

It was not until the post-Renaissance period, fostered by the development of novel anatomical and physiological knowledge that bedside diagnosis was revived. The contributions of gross pathology were perhaps the most insightful. The development of clinico-pathologic correlations allowed physicians to interpret physical findings much more correctly. Likewise, the identification of different abnormalities at autopsy allowed for the search for such signs as part of the clinical examination. Learning physical diagnosis in the autopsy room remains to this day a valid,
yet underused, technique that provides unique insights into clinical observation [26].

It was only in the 19th century that an explosion occurred in the field of physical diagnosis. Landmark developments such as the solidification of percussion (Vienna, Auenbrugger [1722-1809]; Paris, Corvisart [1755-1821]) and auscultation (Paris, Laennec [1781-1826]) reached medical education and practice. With the publication of clinical observations with pathologic correlates, bedside maneuvers became an integral part of the clinical encounter. Even though acceptance of innovations on the physical examination was slow — and often chastised with vile opposition [23, 27, 28] — ultimately bedside diagnosis reached the wider use as seen until recent years. These were times when, guided by developments in the medical sciences and increased rigor of medical education and training, the patient-physician relationship climbed to a new level of interaction and mutual respect, qualities that had been absent since Galenic times [14].

Ushered in by such remarkable progress, one might have expected that the twentieth century would bring the golden age of clinical medicine. The development of new diagnostic technologies could add to the power of the physical examination. New therapeutic discoveries could allow for improved patient care. New scientific milestones could explain long-unanswered questions. Unfortunately, however, what took place was what Shorter called the “irony of the social history of modern medicine.” This can be described as the deterioration of the patient-physician relationship as a result of a progressive detachment of physicians who, propelled by ever-increasing therapeutic assets, lost sight of the more intimate aspects of the clinical encounter, those responsible for generating trust between patient and clinician [8, 14].

In summary, bedside diagnosis has had a “rise and fall” over the past two centuries. It is interesting that the same factor that lead to its earlier solidification — i.e., scientific progress — is also responsible for its gradual demise. The point is that progressive abandonment of the physical examination is a mistake. Bedside diagnosis can be an effective supplement to the present diagnostic armamentarium [12, 13], and particularly worthwhile in an era of cost-containment and progressive loss of the patient-physician relationship.

INTERVENTIONS TO IMPROVE TEACHING OF BEDSIDE DIAGNOSIS

Dedicated teaching of bedside skills is an absolute necessity in the revival of the physical examination. There is no consensus on the best ways to teach physical diagnosis: curricula from different medical schools vary from tutorial courses of short duration and limited structure to highly intensive courses requiring several hours a week throughout the four years of school. It is unclear if any different approach has a different degree of success, although there is evidence to support the preferential use of certain teaching techniques, such as teaching at the bedside, use of patient-instructors, and perhaps use of multimedia programs.

First and foremost, teaching must take place at the bedside. Even though tutorial courses in the classroom are helpful to initiate students in the pathophysiology of bedside maneuvers and the correct choreography while performing the examination, time at the bedside should not be replaced. Merely providing lecture courses does not improve skills [15], whereas a shift to increased time spent at the bedside [7] or structured courses with actual examinations effectively increase students’ skills and/or level of confidence in their abilities. Available studies have shown this
to be true for otoscopy [29, 30], examination of the breast [31], male [32] and female [33] genital examinations, global geriatric assessment [34] and overall skills [35-37]. Furthermore, the observations that cardiologists and cardiology fellows are significantly better than internists and medical residents at cardiac auscultation [5, 9] indicate that increased exposure to these “procedures” (i.e., training) leads to improved skills.

It is necessary that educators keep this need for bedside training at the heart of any curricular plans. A departure from the bedside to the conference room is now the unfortunate rule among attending physicians at case-oriented attending rounds [16], despite express indications by many residency program directors that frequent “trips” to the bedside be made. Conference room teaching of bedside diagnosis seems counterintuitive since the patient, ultimate focus of any discussion, is often not seen at all by the group. Some have argued that bedside teaching should be used with parsimony because of patient’s anxiety and possible fatigue of patients, students, and teachers [38]. However, Linfors and Neelon’s plea [39] to the return to the bedside has a large group of supporters who believe every curricular effort should be made to let students spend supervised time with patients. Only at the bedside, with close supervision, can skills be optimally developed.

The problem of inadequate physical diagnosis training extends to house officers as well. Recent evidence suggests that only a small minority of internal medicine residency programs carry any formal teaching of physical diagnosis [15]. Residency is a time when the setting is quite favorable to learning bedside diagnosis: patients abound; upperclassmen and faculty are readily available to test accuracy and reproducibility of the findings; and the academic setting often allows for the use of technology to corroborate or further shed light on clinical observations. This is seldom encountered in post-training clinical practice. Additionally, Wood et al. have shown that a month-long physical diagnosis elective can be successfully applied to the teaching of medical residents [37], a model that certainly warrants extrapolation, either as a combined research/education elective, or perhaps paired with ambulatory care rotations.

Another valuable tool in the teaching of physical diagnosis is the use of patient-instructors, also known as standardized patients. These are individuals who, after appropriate training, are able to act out a certain number of clinical scenarios. When well prepared by faculty members, they can provide excellent training on the choreography of the physical examination, allowing students to become more comfortable with the technique. In addition, they can provide invaluable feedback on the student’s demeanor, efficiency, and technical skills. This latter attribute is of greatest value for difficult parts of the examination, such as examination of the breast, rectum, and genitalia. It has been my experience and that of others [40-45] that patient-instructors are effective teachers and evaluators of physical diagnosis skills. Their incorporation into physical diagnosis courses should be encouraged, notwithstanding the fact that the organization of such a program requires considerable expenditure.

Finally, the use of interactive multimedia programs, including those with access through the worldwide web, should be explored as possible tools to improve physical diagnosis skills. This technology has been used for other medical fields with excellent acceptance [46-48]. It is conceivable that creative multimedia programs (e.g., fundoscopic images from a moving ophthalmoscope, or varying heart sounds with stethoscope movement across a virtual chest) may be helpful tools in addition to bedside training. Indeed, such innovative
programs already exist, either as CD-ROMS or as websites with free access. Unfortunately, they are still limited to the cardiac and lung exam, and no formal testing of any such interventions has been performed to date. However, this is an area of active development, and the numbers of sites retrieved through searches using the terms “physical diagnosis” or “bedside diagnosis” has risen at an amazing rate over the past two years.

A complementary aspect of teaching that must not be forgotten is adequate evaluation. Unfortunately, clinical faculty members are often poor evaluators of skills in history-taking and physical examination [49]. In view of personal and reported observations, it is prudent that students be evaluated by faculty specifically prepared to do so. The ultimate goal is to provide uniformity and fair judgment, features that are often not achieved by evaluators [49]. It has been shown that provision of material to prepare evaluators (e.g., videos of standardized evaluations), as well as checklists of points that need to be observed improve the uniformity of evaluations [43, 45, 49, 50].

CLINICAL SCRUTINY OF THE PHYSICAL EXAMINATION

Two of the integral components of a successful procedure are accuracy and reproducibility. The physical examination should be evaluated in the same way as any other medical procedure, and only critical scrutiny of the operating characteristics of the physical examination (sensitivity, specificity, positive and negative predictive values) will be able to discern which maneuvers to maintain, and which to banish from practice. This idea is not new [17-21], and efforts over the past decade have been implemented to improve the evaluation of the physical exam. In fact, several of the more prominent medical societies and internal medicine journals have shared in the endeavor of discussing and publishing literature on bedside diagnosis. Initiatives have included published annotated bibliographies [51, 52], a physical diagnosis interest group composed of many distinguished educators/researchers in the field (visit the website at http://www.sgim.org/interest-groups/clinexam.html), and a series of papers on the “rational clinical examination” of the Journal of the American Medical Association, an effort to gather critical papers on the value of the physical exam to approach many clinical questions. The driving force behind these initiatives is to evaluate available data and, perhaps more importantly, to identify areas that deserve further research.

The approach to the available data on bedside diagnosis should consist of three components: knowing what works, understanding what does not work, and researching what is unknown. Firstly, it is important to identify items of the exam that have been proven effective, either as screening or investigative measures. A typical example is blood pressure measurement. Meticulous teaching and performance of these parts of the examination in order to guarantee accurate and reproducible results are mandatory.

Recognizing bedside tests of limited value is also crucial. Many long-acclaimed procedures are used without evidence to support their value, and often, with substantial work implying their inaccuracy. Examples include signs of volume depletion, chest and precordial percussion, and the physical signs of increased cardiac filling pressures [53-57], among many others. The understanding of the limitations of such maneuvers reduces the inappropriate use of the physical examination.

The quality of data on physical diagnosis is not always optimal [21, 52]. Thus, the idea that we must research what is not known is an important one. There are numerous areas that require study to
identify the ability of the physical examination to detect disease, and demonstration of its efficacy as a screening tool for many conditions could result in substantial health care savings. It is essential however, that one keeps an open mind with regard to the utility and limitations of one’s favorite bedside tests — often this bias leads to poor acceptance of published work [58-61].

In conclusion, I have briefly reviewed the course of bedside diagnosis through past and recent times, its observed fall, and potential strategies to be applied in its revival. Greater concentration on improved research — an open field for young and established investigators alike [20] — should take the forefront of efforts. Once supported by solid data, a rational physical exam can be taught to students and residents who will then be able to effectively respond to demands of the current socio-economic conjuncture.

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