The Enduring Value of the Physical Examination

Junaid A.B. Zaman, MA, BMBCh, MRCPa,b,c,*

KEYWORDS

• Clinical examination • Bedside medicine • History and physical examination • Value

KEY POINTS

• Physical examination has been a vital tool in medical diagnosis over the last few centuries, but has come under increasing scrutiny because technological aids to diagnosis are thought more reliable.

• It has value beyond diagnostic accuracy, especially in fundamental areas, such as patient safety and cost, and has been shown to improve physician and patient satisfaction with clinical encounters.

• There are certain diagnoses that can only be made by physical examination, and others whereby risk stratification and prognosis are based on physical examination of physiologic function.

• Physical examination complements the increasing technological tools available for bedside diagnosis, and an “either-or” mentality is best avoided.

INTRODUCTION

Physical examination (PE) is defined as “an examination of the bodily functions and condition of an individual.”¹ This article focuses exclusively on PE in the context of clinical medicine, that is, the interaction between a health care provider and patient. In short, the title of the article is a statement ratified throughout the article, namely that there is not only benefit (value) to PE, but also that it will continue to last (endure) for some time. Both “enduring” and “value” are explored in more depth with respect to the future integration of PE into the clinical assessment of a patient and how its value extends well beyond current diagnostic/cost-based metrics.

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* Program for Bedside Medicine, Stanford Hospital, Palo Alto, CA 94305.

E-mail address: jzaman@stanford.edu

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EVOLUTION OF THE PHYSICAL EXAMINATION

PE was not always a part of medicine. Its introduction into Western medicine can be traced throughout the last few centuries when novel techniques were applied to aid diagnosis of the sick. It is beyond the remit of this article to detail these discoveries by pioneers of the field (eg, percussion by Auenbrugger or auscultation by Laennec). These discoveries developed into distinct European models of PE and were later incorporated at the bedside by Sir William Osler into the present ritual of inspection, palpation, percussion, and auscultation. With his illustrious career spanning Canada (McGill), United States (Pennsylvania, Hopkins), and United Kingdom (Oxford), perhaps nobody was more central than Osler to the modern practice of bedside PE. His bedside philosophy still permeates through teaching at these institutions and beyond. The evolution of PE is superbly reviewed in Refs. 3, 4 for those wishing further detail; the pivotal moments are summarized in Table 1.

There have always been those who doubt the central role of PE in bedside diagnosis. However, the modern “age of investigations,” whereby imaging and laboratory tests are often deemed to have more accuracy than PE maneuvers, presents unique challenges to the primacy of the PE in its current form. Although traditionally thought to lead to approximately 20% of diagnoses (with history comprising 70% and investigations comprising 10%), the dogma of history, examination, investigation is increasingly eroded by hospital workflows whereby much of the initial workup focuses on investigation results, and much of the “H&P” is duplicated from admission clerking. Furthermore, the annual “general physical” for screening in the healthy population is also under attack. Many think it can be replaced by a review of key results and history risk factors and argue this helps improve allocation of health care resources from the well to those who need care.

The division between PE and bedside investigation is increasingly blurred, because electronic instruments such as handheld ultrasound machines allow instant access to advanced imaging. Although some see this clash as an “either/or,” predicting the end of the binaural stethoscope as is currently known, there are others who not only use clinical cases to highlight the unique importance of bedside auscultation but also

<table>
<thead>
<tr>
<th>Date</th>
<th>Person</th>
<th>Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>ca. 400 BC</td>
<td>Hippocrates</td>
<td>Medicine as a profession; disease natural, not divine</td>
</tr>
<tr>
<td>ca. AD 1300</td>
<td></td>
<td>Dissection of human bodies increased</td>
</tr>
<tr>
<td>1543</td>
<td>Vesalius</td>
<td><em>Fabrica</em> published; first accurate anatomy text</td>
</tr>
<tr>
<td>ca. 1670</td>
<td>Sydenham</td>
<td>Classification of disease</td>
</tr>
<tr>
<td>1761</td>
<td>Morgagni</td>
<td><em>De Sedibus</em> published. Pathology begins</td>
</tr>
<tr>
<td>1761</td>
<td>Auenbrugger</td>
<td>Percussion discovered</td>
</tr>
<tr>
<td>1808</td>
<td>Corvisart</td>
<td>Popularization of percussion</td>
</tr>
<tr>
<td>1816</td>
<td>Laennec</td>
<td>Stethoscope invented, distributed with each copy of his book</td>
</tr>
<tr>
<td>1800–1850</td>
<td>Louis</td>
<td>French School establishes systematic approach to clinical case, still in use to this day</td>
</tr>
<tr>
<td>1830–1900</td>
<td>Mueller</td>
<td>German School adds insight from mechanisms of disease, studied by experimental methods</td>
</tr>
<tr>
<td>1889</td>
<td>Osler</td>
<td>Medical clinic opens at the Johns Hopkins Hospital</td>
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integrate the use of handheld echo as a PE technique, such as in the Stanford 25.\textsuperscript{11}
This set of 25 PE maneuvers, techniques, and tips does not exclude the handheld ultrasound, instead actively integrating it into the learning set of modern PE moving away from the dogma of what previously constituted PE. However, it is not only within the definition presented at the start but also a key way to evolve the PE to assimilate technology, rather than appear increasingly estranged from medical progress, which invariably involves new technology.

Another example of how technology is critical to incorporate into PE is the use of video examination during neurologic assessment, as is now often routine for deciding indications for acute thrombolysis of stroke. The observation of asymmetry in facial muscles during speech is as important as proper technique for eliciting reflexes. Such observations can now be done remotely, albeit they may take longer and be less accurate than bedside evaluation.\textsuperscript{12} With more and more telemedicine consultations happening globally, this is likely to continue the evolution of the PE to a form that may be significantly different than Osler’s time.

**KEY ELEMENTS OF A MODERN PHYSICAL EXAMINATION**

Despite the evolution of PE, there are key elements that remain unchanged and are worth explicitly stating at this stage to provide a framework for establishing its value.

The first key attribute is that it is patient centered and individual in nature. The ritual of the physician and patient has been eloquently summarized by Abraham Verghese and colleagues\textsuperscript{13} and can itself impart significant therapeutic benefit. It cannot be done on multiple patients at once and hence requires the exclusive attention of the examiner. It is a serial, not a parallel activity.

There is great importance placed on consent and good communication in modern medical school training, to allow the patient to feel comfortable during the examination. This may be foregone in medical assessments, which artificially limit history taking and hence diagnostic information to the PE alone, but there is a continuous 2-way dialogue during everyday PE that helps to build rapport between the patient and physician.

Once consented, observation comes first. This is part of the routine of all PE (inspection, palpation, percussion, auscultation; look, feel, move) and has been popularized in the fiction of Sir Arthur Conan Doyle, who based his detective character Sherlock Holmes on a Scottish surgeon’s acute powers of observation. Looking at a patient’s scars or gait can give away a diagnosis before any physical contact, something which the trained medical mind assesses during every PE.

Reassurance of the patient that this will not inflict undue suffering or pain is also part of good modern PE. Sometimes it is necessary to elicit a sign, such as guarding, or rebound tenderness, which is unpleasant, but this should be kept to a minimum and the patient forewarned, unless it compromises diagnostic yield. Modern medicine requires chaperones for protection of both examiner and patient in what is otherwise a very vulnerable encounter, with ritual undressing and physical contact crossing boundaries no other stranger is allowed to do routinely.

Two key elements of PE occupy a large proportion of the accumulated literature on PE. The formulation, or reasoning of the signs elicited and how they interact with the history of a given patient, is part of a term called “clinical acumen,” which is best learned by the bedside rather than from books. Conversely, the differential diagnosis of a sign or group of findings can be learned from a book, with the bedside experience required to learn the different techniques and ways to obtain reliable, objective data to aid in achieving a diagnosis.
VALUE OF THE PHYSICAL EXAMINATION

The value of the PE is more than just its diagnostic accuracy, although this is the primary outcome in most circumstances. Proper technique in PE requires training (often in small groups), practice, willing patients, and passion on the part of the learner. Improper technique can cause harm and unnecessary suffering, and sometimes, irrevocable loss of trust in the examiner. It is therefore one of the most important skills learned during training. A curious mind set helps to keep these skills evolving throughout an entire career.

The diagnostic value of the PE can in many cases be compared with other modalities such as imaging or other diagnostic testing. This often leads to synergy between the 2 but it is not a mutually exclusive approach. Books such as Evidence-based Physical Diagnosis14 and journal series such as the Rational Clinical Examination15 proliferate the message that there is a quantitative method of assessing how PE contributes to diagnosis in many common conditions. However, even in the age of technology, the PE remains the diagnostic gold standard for many diseases.

Clinically, there are situations where PE informs prognosis of a patient, such as the Killip classification in NSTEMI16 or the functional neurologic deficit in determining stroke severity.17 These are vital to the triage of patients for specialized and often invasive tests. Furthermore, there are "clinical diagnoses" that can only be made using PE; these include many neurologic, rheumatologic, and dermatologic conditions.

On a holistic level, PE provides a welcome respite for many physicians from the electronic medical record.18 Patient contact has benefits for both physicians and patients.19 These benefits include improved patient ratings of care20 and reduced physician discontent.21 Observational data support the pivotal role of PE in guiding diagnosis, therapy, and management, the sine qua non of the patient–doctor relationship.22,23

In addition, PE reinforces the physician–student relationship, especially in practices where teaching is a large part of daily medical rounds.24 Personally, the silence as my stethoscope engages my ears and the gradual tuning into the rhythm of the patient’s heartbeat is a refreshingly escapist experience every time.

A new conceptual framework for assessing the value of the PE beyond diagnostic positive predictive values, sensitivity, or specificity was recently proposed.25 These themes are shown in Fig. 1 and highlight the benefit of PE across many disciplines and to many stakeholders other than the patient.

Most definitions of clinical value include outcome expressed as a function of cost.26 The 2 key metrics in the framework above which best capture this are patient safety and cost. Given the variability of clinical outcome measures, data on whether PE can directly benefit clinical outcome are limited. However, a recent series of “systematically collected anecdotes” shows how not performing PE was a major factor in medical error,27 and by inference, patient safety. The denominator, cost, is even more challenging to quantify as the alternative of using technological aids to diagnosis has clearly fixed costs, yet the cost of PE is primarily derived from use of clinician’s time. There are few scenarios or studies where the 2 can be compared directly. Judicious use of PE to guide diagnostic tests, especially those with the potential to cause harm, such as exposure to ionizing radiation, will both improve patient safety and reduce cost by allocating resources based on clinical need, improving value from both sides of the outcome/cost equation.

FUTURE OF THE PHYSICAL EXAMINATION

With the rapid development of technology, it is easy to be negative about the role of PE in the future care of patients.28 It has clearly already suffered a decrease in priority
of medical education, with many residents unable to get away from the “iPatient” on their computer screens and back to the bedside.29

This is reflected in current assessments focusing on history (US Medical Licensing Examination [USMLE] step 2 CS) and knowledge base (USMLE steps 1, 2CK). Clinical skills assessment is difficult to standardize, expensive to operationalize, and requires real-life patients. This theme is expertly discussed later in this issue (See “Clinical Skills Assessment in the 21st Century”) by Andrew Elder, echoing recent high-profile opinion pieces.30

Teaching at the bedside remains the main unit of learning PE. Although it is resource intensive, requiring small groups, it is still highly valued by students and often by patients.31 The modern development of bite-size teachable moments such as the “5-minute moment” will help increasingly time-pressured teachers and learners condense learning into a key “nugget” that can be effectively taught in 5 minutes.32 This special edition of the Medical Clinics of North America, conferences such as the Stanford 25 Bedside Clinical Skills Symposium,33 organizations such as the Society of Bedside Medicine,34 and a recent report by the Institute of Medicine (now the National Academy of Medicine)35 confirm this is a high priority for future medical education.

SUMMARY

PE has been integral to development of medicine as it is known. It is likely that some form of patient-physician individual interaction will always be required. PE has utility beyond just cost and diagnostic accuracy. Ideally, it needs assessment to stress
importance rather than just “cultural norms.” Finally, technology integration should be actively encouraged to keep PE up-to-date with modern medicine.

REFERENCES