

Editorial

Jorge A. Restrepo, Richard Henriquez, Dario Torre* and Mark L. Graber

The physical exam and telehealth: between past and future

<https://doi.org/10.1515/dx-2023-0154>

The physical examination: a declining skill

Performing the physical examination is an essential skill for any expert diagnostician [1] and has been an integral part of the patient encounter for centuries. However, many studies have shown a decline in physical exam skills among physicians and trainees [2–4]. The reason for this decline is likely multifactorial including increased reliance on technology, lack of bedside teaching [5] and the pressures of time constraints [6]. This issue is further compounded by the 2023 CPT documentation guidelines for evaluation and management (E/M Services) that no longer require documentation of a physical exam for billing. This decay has led to a series of harmful and undesired consequences including an increased risk of diagnostic errors, unnecessary investigations, and unneeded referrals, all resulting in added health care costs and difficulty in meeting patient needs, particularly in low resource settings [7–9]. On the other hand, telehealth saw massive growth during the COVID 19 pandemic. Between 2010 and 2017, the percentage of US hospitals using telehealth services rose from 35 to 76 % [10–12]. While it's unclear if telehealth has directly contributed to a further decline of physical examination skills, the shift towards telehealth has resulted in a loss of in person physical examination in primary care [13].

***Corresponding author: Dario Torre**, MD, MPH, PhD, Professor, Department of Internal Medicine, University of Central Florida College of Medicine, Orlando, FL, USA; and Department of Education, Orlando VA Healthcare System, Orlando, FL, E-mail: Dario.Torre@ucf.edu

Jorge A. Restrepo and Richard Henriquez, Department of Internal Medicine, University of Central Florida College of Medicine, Orlando, FL, USA; and Department of Education, Orlando VA Healthcare System, Orlando, FL, USA

Mark L. Graber, Stony Brook University, New York, NY, USA

The new challenges of the virtual physical exam

The challenge of conducting a physical examination during a telehealth visit predates the COVID-19 outbreak. A systematic review by Lu et al. concluded that a focused telehealth exam including neurological, HEENT, cardiopulmonary, and musculoskeletal components was equivalent to in-person physical exam [14], though acknowledging a wide range of inter-rater reliability. A scoping review by Yao et al. [15] found that the most frequently conducted unassisted virtual physical exam were neurologic, musculoskeletal, neuropsychologic exam and skin exam. Out of 61 studies reviewed, the virtual exam was considered equivalent to in-person examination in 54 of these studies (89 %) but inferior in 7 (11 %) [15]. Goyal et al. compared in-person to telehealth neurological evaluations (toe walking, tandem walking, Romberg's test, and rapid alternative movements) in patients with cervical or lumbar disc disease, and concluded they were equivalent [16]. In addition, many surgical specialties such as urology and orthopedics found the majority of surgical and procedural plans (e.g. cystoscopy, prostate biopsy, vasectomy) developed during patient telehealth visits were rarely altered after subsequent in-person examinations [17–19]. Yet, most of these studies were limited by small sample sizes and focused on specific physical exam domains that only required observation rather than 'hands-on' physical examination skills such as lung and heart auscultation, or palpation of the abdomen. Although the research to date suggests that virtual exams may suffice in certain circumstances, future research is needed to expand the range of physical exam maneuvers studied and how they can be integrated in the patient encounter, while exploring physician's abilities and opportunities to perform virtual physical examinations across different care settings and clinical contexts.

There are also risks associated with a virtual examination. As one example, physicians would lose the opportunity to perform a comprehensive physical exam for a new healthy patient, where unexpected physical findings, such as hepatomegaly or lymphadenopathy, could be discovered.

A second example are skin cancers detected incidentally. In a study from the UK, among patients with suspicious skin lesions who were then referred for a total body skin exam done by a dermatologist, 22 % of the malignancies diagnosed were incidentally found during an in-person physical exam [20]. The restrictions of a computer screen with variable resolution and clarity will most likely prevent such skin incidental findings from being found in routine visits. Valdes and Utter [21] point to the inability to perform a full physical exam and to visualize areas hidden from the screen as critical factors that led to the misdiagnosis of a patient who eventually developed sepsis from a perianal abscess. The case highlights the need to provide physicians with alternative options to virtual care when and if the physician feels uncomfortable or unable to perform specific and necessary components of the physical exam. Telehealth visits can be convenient, may save patient's time, and alleviate issues of transportation, but the limitations of a virtual physical exam should always be carefully and judiciously considered.

Further, the in-person physical exam is not only an important tool to gather clinical information but also a critical component of a physician's professional identity. It is an important practice that promotes human connection with patients, ultimately contributing to the physician's personal and professional satisfaction [13].

Technology as aid to virtual physical exam

Despite the opportunities offered by the continuous advance of technology, performance of physical exam in the telehealth setting remains a challenging endeavor. Performing an unassisted physical exam through a video interface can be affected by technology literacy, patients' comorbidities and safety concerns, physicians' level of comfort, patient mobility, and communication skills [17–19]. Many patients would need to have another person present during the examination to assist with certain maneuvers. Patients unfamiliar with telehealth technology might experience “computer anxiety,” which could hinder their performance during the visit [22]. Further challenges come into play where certain physical exam findings are key to a patient's diagnosis and triage. For example, essential elements of a spine examination include testing extremity reflexes and assessment of pathologic reflexes (e.g., the Hoffman and Babinski reflexes), all difficult to complete via telehealth without a live assistant [23]. Some elements of the physical

exam are difficult to describe to patients, and others may need testing tools and instructions prior to the telehealth visit, adding to the burden of resources needed for conducting effective remote physical examinations. Moreover, technology presents its own limitations given that different patients will have different video capabilities, variable technological hardware, and physical environmental limitations. Additional studies are needed to address many these challenges.

History and physical examination are tools for information gathering, an essential component of clinical reasoning [24]. The collection of accurate physical exam data is critically important for the diagnostic reasoning process. Physicians need to take into account the new telehealth context in which they operate, and recognize that sensitivity, specificity and positive predictive values of physical exam maneuvers may no longer apply in the new telehealth context.

Finally, teaching the physical exam in the telehealth setting poses an additional challenge. The training of medical students and trainees to conduct physical examinations both effectively and efficiently remains a critical step in learning the diagnostic process. Some resources have been developed to instruct future physicians on performing virtual examinations [12]. Learners' supervision in a telehealth environment can be both challenging and awkward, requires specific faculty development, and can be constrained by the quality of and access to technology available for the learning sessions [25]. More research is needed in this area.

Innovations and future trends in the virtual physical exam

Ongoing innovations offer promising solutions in telehealth-based physical exams. Wearable technologies can help obtain vital signs, and electronic stethoscopes and otoscopes are other new tools. Guiding the patient through self-examination is another creative approach that can be used in telehealth encounters, or the parts of the exam can be facilitated by a nurse or family member. Physicians can ask patients to measure their own vital signs, guide them through range of motion movements for musculoskeletal examinations, and even instruct them on abdominal palpation. Though many of these solutions are innovative and promising, validity evidence is still lacking.

In the past several years the advent of artificial intelligence (AI) has begun to change the clinical and educational

landscape in health profession education, and in particular how we teach the physical exam in medical school and residency. Educators could create AI-based scenarios that reproduce specific contexts, including the development of visual and auditory conditions that may foster learning of physical exam skills. Existing simulations can be augmented by virtual reality with integration of multimedia devices, that may create new opportunities for teaching and assessment of physical exam skills. Similarly, there could be an impact on patients and physicians in performing physical exam in remote setting. You can envision patients equipped with AI-powered devices at home to gather physical exam information otherwise not possible. For example, an AI powered stethoscope could conceivably be maneuvered to auscultate the heart of a patient who can't move or communicate effectively, transmitting information to the physicians remotely. Research is needed to judge the impact of gathering telehealth physical exam data on the clinical reasoning process and the likelihood of diagnostic errors.

Artificial intelligence will soon be used to assist in deriving an appropriate differential diagnosis. AI applications appear to be on track to meet or exceed the performance of the average clinician in the near future in this regard, but one thing is certain: The ultimate reliability of using AI for differential diagnosis will be entirely dependent on the quality of the history and the physical examination conducted by the clinician.

In conclusion, the physical exam remains a vital component of the diagnostic process and its role in telehealth requires greater clarity and further exploration. Medical regulatory boards and professional societies must offer guidance on the nuances and importance of physical exam skills in the digital age. As we transition into a telehealth environment, the question isn't just about how we teach physical exam to trainees but how we best leverage the affordances of telehealth to gain a better understanding of how it can contribute to provide safe, high value care to our patients.

References

1. Feddock CA. The lost art of clinical skills. *Am J Med* 2007;120:374–8.
2. Johnson JE, Carpenter JL. Medical house staff performance in physical examination. *Arch Intern Med* 1986;146:937–41.
3. Wray NP, Friedland JA. Detection and correction of house staff error in physical diagnosis. *JAMA* 1983;249:1035–7.
4. LaCombe MA. On bedside teaching. *Ann Intern Med* 1997;126:217–20.
5. Armstrong DW, Tobin C, Matangi MF. The accuracy of the physical examination for the detection of lower extremity peripheral arterial disease. *Can J Cardiol* 2010;26:e346–50.
6. Block L, Habicht R, Wu AW, Desai SV, Wang K, Novello Silva K, et al. In the wake of the 2003 and 2011 duty hours regulations, how do internal medicine interns spend their time? *J Gen Intern Med* 2013;28:1042–7.
7. Verghese A, Charlton B, Kassirer JP, Ramsey M, Ioannidis JP. Inadequacies of physical examination as a cause of medical errors and adverse events: a collection of vignettes. *Am J Med* 2015;128:1322–4.e3.
8. Zaman J, Verghese A, Elder A. The value of physical examination: a new conceptual framework. *South Med J* 2016;109:754–7.
9. De Freitas S, Connolly C, Sharif F. Back to the bedside: cutting costs with physical examination skills. *Clin Anat* 2017;30:431.
10. Elhennawy A, Alsalem FA, Bahri S, Alarfaj N. Telemedicine versus physical examination in patients' assessment during COVID-19 pandemic: the dubai experience. *Dubai Med J* 2021;4:175–80.
11. Kichloo A, Albosta M, Dettloff K, Wani F, El-Amir Z, Singh J, et al. Telemedicine, the current COVID-19 pandemic and the future: a narrative review and perspectives moving forward in the USA. *Fam Med Community Health* 2020;8:e000530.
12. Benziger CP, Huffman MD, Sweis RN, Stone NJ. The telehealth ten: a guide for a patient-assisted virtual physical examination. *Am J Med* 2021;134:48–51.
13. Hyman P. The disappearance of the primary care physical examination – losing touch. *JAMA Intern Med* 2020;180:1417–18.
14. Lu AD, Veet CA, Aljundi O, Whitaker E, Smith WB 2nd, Smith JE. A systematic review of physical examination components adapted for telemedicine. *Telemed J E Health* 2022;28:1764–85.
15. Yao P, Adam M, Clark S, Hsu H, Stern M, Sharma R, et al. A scoping review of the unassisted physical exam conducted over synchronous audio-video telemedicine. *Syst Rev* 2022;11:219.
16. Goyal DKC, Divi SN, Schroeder GD, Pfeifer R, Canseco JA, Bowles DR, et al. Development of a telemedicine neurological examination for spine surgery: a pilot trial. *Clin Spine Surg* 2020;33:355–69.
17. Eyrich NW, Andino JJ, Ukavwe RE, Farha MW, Patel AK, Triner D, et al. The lack of a physical exam during new patient telehealth visits does not impact plans for office and operating room procedures. *Urology* 2022;167:109–14.
18. Doolittle J, Gill B, Vij S. PD25-12 online vasectomy consults: is a pre-vasectomy physical exam really necessary? A case-control study. *J Urol* 2021;206(Suppl 3):e436.
19. Lightsey HM, 4th, Crawford AM, Xiong GX, Schoenfeld AJ, Simpson AK. Surgical plans generated from telemedicine visits are rarely changed after in-person evaluation in spine patients. *Spine J* 2021;21:359–65.
20. Omara S, Wen D, Ng B, Anand R, Matin RN, Taghipour K, et al. Identification of incidental skin cancers among adults referred to dermatologists for suspicious skin lesions. *JAMA Netw Open* 2020;3:e2030107.
21. Valdes W, Utter G. Delayed diagnosis in the setting of virtual care: remembering the physical examination. *WebM&M Case Studies*; 2021. <https://psnet.ahrq.gov/web-mm/delayed-diagnosis-setting-virtual-care-remembering-physical-examination>.
22. Iyer S, Shafi K, Lovecchio F, Turner R, Albert TJ, Kim HJ, et al. The spine physical examination using telemedicine: strategies and best practices. *Global Spine J* 2022;12:8–14.
23. Satin AM, Lieberman IH. The virtual spine examination: telemedicine in the era of COVID-19 and beyond. *Global Spine J* 2021;11:966–74.
24. Daniel M, Rencic J, Durning SJ, Holmboe E, Santen SA, Lang V, et al. Clinical reasoning assessment methods: a scoping review and practical guidance. *Acad Med* 2019;94:902–12.
25. Carpenter AB, Sheppard E, Atabaki S, Shur N, Tigranyan A, Benchoff T, et al. A symposium on the clinic of the future and telehealth: highlights and future directions. *Cureus* 2021;13:e15234.