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Inadequacies of Physical Examination as a Cause of Medical Errors and Adverse Events: A Collection of Vignettes

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ABSTRACT

BACKGROUND: Oversights in the physical examination are a type of medical error not easily studied by chart review. They may be a major contributor to missed or delayed diagnosis, unnecessary exposure to contrast and radiation, incorrect treatment, and other adverse consequences. Our purpose was to collect vignettes of physical examination oversights and to capture the diversity of their characteristics and consequences.

METHODS: A cross-sectional study using an 11-question qualitative survey for physicians was distributed electronically, with data collected from February to June of 2011. The participants were all physicians responding to e-mail or social media invitations to complete the survey. There were no limitations on geography, specialty, or practice setting.

RESULTS: Of the 208 reported vignettes that met inclusion criteria, the oversight was caused by a failure to perform the physical examination in 63%; 14% reported that the correct physical examination sign was elicited but misinterpreted, whereas 11% reported that the relevant sign was missed or not sought. Consequence of the physical examination inadequacy included missed or delayed diagnosis in 76% of cases, incorrect diagnosis in 27%, unnecessary treatment in 18%, no or delayed treatment in 42%, unnecessary diagnostic cost in 25%, unnecessary exposure to radiation or contrast in 17%, and complications caused by treatments in 4%. The mode of the number of physicians missing the finding was 2, but many oversights were missed by many physicians. Most oversights took up to 5 days to identify, but 66 took longer. Special attention and skill in examining the skin and its appendages, as well as the abdomen, groin, and genitourinary area could reduce the reported oversights by half.

CONCLUSIONS: Physical examination inadequacies are a preventable source of medical error, and adverse events are caused mostly by failure to perform the relevant examination.

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According to the Institute of Medicine's report entitled "To Err is Human,"[1] medical errors cause nearly 100,000 deaths per year. The causes are systemic problems of inadequate organization, a culture of nondisclosure, and cognitive diagnostic errors.[2-4] A potentially important type of error that has been given meager attention is deficiencies in physical examination.

The high-tech transformation of medical care has resulted in diminishing direct patient-physician interaction. Hospitalists in America might spend only 18% of their on-duty time in direct patient care,[5] and duty-hour restrictions have

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resulted in Internal Medicine interns spending on average only 12% of their time with patients but 40% of their time on computer-related tasks.[6]

Diminished focus on the physical examination may result in important errors. We asked physicians to contribute clinical vignettes of oversights and errors in physical examination and adverse consequences that resulted from them. This database was created to identify the diverse types and characteristics of errors that can be made relating to the physical examination.

CLINICAL SIGNIFICANCE

- Most errors in the physical examination that lead to consequences are related to not performing an examination.
- Failure to undress the patient and examine the skin is a frequent cause of error.
- In a patient with abdominal pain, failure to examine the groin, rectal area, and hernia orifices can have dire consequences.

METHODS

We designed an 11-question, qualitative survey for physicians, who were asked to send us vignettes of known instances of oversights in physical examination and to answer related multiple choice questions. The study was approved by the Stanford University Institutional Review Board; the detailed instructions to the respondent and the questionnaire can be found online at www.surveymonkey.com/s/8S6DL7V.

A link to the questionnaire was sent to approximately 5000 physicians of diverse specialties using a commercial medical e-mail marketing service (MMS Inc, Woodale, Ill), with an estimated 2800 of these having teaching affiliations. In addition, we used social media sites to disseminate the link, and we encouraged physicians to share the link. There were no limitations regarding type of specialty and clinical practice setting.

Data were gathered from February to June of 2011. Each entry was reviewed by 2 physicians. We excluded: entries that did not form a vignette (eg, "residents don't do rectal exams often enough"); entries missing critical information to form a vignette (eg, a failure to state what precisely was omitted/misinterpreted); entries with 2 or more vignettes combined when it became impossible to parse out which one was being addressed in the multiple choice questions. We corrected a response only when the answer to a multiple choice question clearly contradicted the vignette, suggesting the respondent selected the wrong box (eg, the narrative describes a missed hernia in a patient with pain because the abdominal examination was not done, but the respondent ticks "finding elicited but misinterpreted" in lieu of "failure to do relevant exam").

RESULTS

Of the 263 responses received, 55 were excluded; of the 208 remaining responses, 27 were corrected by the criteria described in Methods.

Sixty-three percent of vignettes reported that the oversight was caused by a failure to perform the physical examination; 14% reported that the correct physical examination sign was elicited but misinterpreted. Eleven percent reported that the relevant sign was missed or not sought, and 12% reported "other" as the cause of the deficiency.

Consequence of the physical examination inadequacy included missed or delayed diagnosis in 76% of cases, incorrect diagnosis in 27%, unnecessary treatment in 18%, no or delayed treatment in 42%, unnecessary diagnostic cost in 25%, unnecessary exposure to radiation or contrast in 17%, and complications caused by treatments in 4%.

The person thought responsible for the oversight was most often an intern or resident (reported in 95 of 208 cases or 46%), a primary care physician (84, 40%), a specialist (79, 40%) or fellow (18, 9%). Though there was no multiple choice option available to implicate one's self as the person responsible, 9 responders (4%) indicated themselves as the physician responsible.

The number of physicians thought to have missed an important aspect of the examination is shown in **Figure 1**. The oversight was typically discovered within 5 days (**Figure 2**). When participants were asked to estimate what percentage of practicing physicians have made a similar error to the one described, they estimated it to be >95% in 43 instances (20%), 50-95% in 42 instances (20%), and 5-50% in 78 oversights (37.5%), and less than 5% in 28 instances (28%).

The list of findings overlooked is long and diverse, but those that were missed more than 5 times included abdominal mass/organomegaly (n = 21, including 3 pregnancies and 2 distended bladders), diagnostic skin finding (n = 15, such as café au lait spots, neurfibroma, erythema migrans, syphilitic lesions, and meningococcemia lesions but not including herpes zoster), neurologic findings (n = 18), murmurs/rubs (n = 13, including 4 missed aortic stenosis, 3 missed pericardial rubs), lymphadenopathy (n = 10), groin hernia (n = 10) or scrotal/testicular pathology (n = 6), signs of peritonitis (n = 10), breast masses (n = 9), fracture or orthopedic finding (n = 9), congestive heart failure (n = 8),

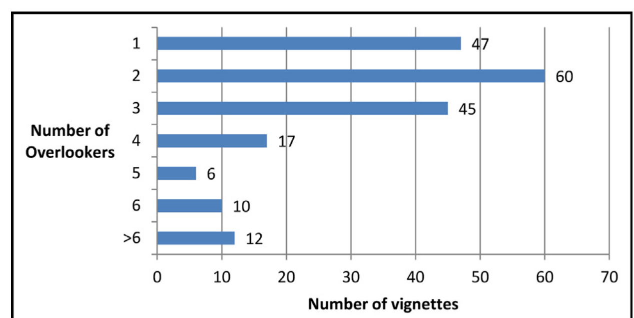

Figure 1 Distribution of number of overlookers for 208 oversights in physical exam.

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