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Value of Visual Screening by Medical Doctors in Diagnosing Alcohol Abuse: A Prospective Study

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Abstract

Goal of the study: To determine the ability of physicians to identify persons suffering from alcohol abuse by a visual first-look evaluation and to assess the impact of the examiner's clinical experience on the accurateness of the evaluation.

Method: 28 Doctors working in two hospitals determine with a rapid visual contact if 157 in-patients suffer from alcohol abuse. Every patient was independently evaluated for alcohol abuse based upon the CAGE questionnaire and DSM-IV criteria, considered together as "gold standard".

Results: 1118 evaluations were performed. Alcohol abuse was diagnosed in 19.7%, using gold-standard. The specificity of a visual first-look evaluation was 90.55%, the positive predictive value 62.5% and the positive likelihood ratio 3.89. The sensitivity was 40%. There was no statistically significant difference in performance according to clinical experience.

Conclusions: Sensitivity of rapid visual inspection for diagnostic of alcohol abuse is weak and thus not appropriate for screening. Specificity, however, approaches that of CAGE. Clinical experience of the examiner had no impact on performance.

Keywords: Alcohol abuse; Screening; Diagnosis; Visual first-look evaluation; Visual inspection; CAGE; Primary care

Introduction

In 2014, slightly less than 5% of Switzerland's populations were estimated to suffer from alcohol dependence [1]. For patients hospitalized in general care units the prevalence of alcohol abuse is significantly higher with approximately 20% [2,3] whereas in the primary care population, the prevalence ranges from 6% to 15% [4]. Consequently in their daily practice, primary care physicians and hospital physicians are confronted frequently with persons suffering from alcohol use disorders, yet these persons are difficult to identify [5]. Despite the fact that alcohol use disorders give rise to significant morbidity and mortality rates and create a considerable socioeconomic burden, unhealthy alcohol use is under-diagnosed [6]. Furthermore, even simple and useful detection tools, such as the CAGE questionnaire, are underused [7,8].

Alcohol abuse can be reliably diagnosed by an integrative approach that entails taking a detailed patient history (including the frequency and number of drinks consumed), performing a complete physical examination and by structured questionnaires [9,10]. This type of process relies on the skill of the practitioner and also partly on the reliability of the patient; moreover, it is especially time consuming [10]. Thus it is possible for doctors to overlook cases of alcohol abuse.

Some indicators of alcohol abuse, the specificity of which varies, can be seen immediately or easily during an examination; examples include facial swelling, periorbital edema, telangiectasia of cheeks, ala nasi, and ears, rosacea (and, more frequently in men, rhinophyma) [11-14]. Other indicators, such as a coated tongue, or proximal muscle wasting and truncal obesity (pseudo-Cushing's syndrome) only become apparent during a slightly more in-depth physical examination.

Nevertheless, since these observations were drawn from several different studies, the limited value of clinical judgement in diagnosing alcohol abuse and alcohol dependence [6,15] has to be kept in mind.

The presented study seeks to evaluate doctors' performance in identifying persons with alcohol disorders based solely on an initial visual clinical examination. Furthermore it seeks to determine how clinical experience impact the performance of the examiner.

Ethical Approval

The study was approved by the Intercantonal Committee of Ethics Jura-Fribourg-Neuchâtel (N°05/2008).

Methods

A proposal was submitted for a prospective multicenter blind study to be conducted in two separated morning sessions in two semi-urban general hospitals from the Hôpital Neuchâtelois (La Chaux-de-Fonds and Pourtalès), Switzerland. The study was conducted over a two months period.

To evaluate the doctors' diagnostic performance in recognizing persons suffering from alcohol abuse (AA), 28 doctors employed at the departments of internal medicine of the two facilities were enrolled. The

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doctors, who did not know the patients at the other location, switched hospitals for the visit. Both groups of examiners included senior physicians (department heads, chief residents), residents (doctors in the first six months to three years of their postgraduate work) as well as medical students (in their 5th and 6th years of study).

The physicians and medical students working at the internal medicine departments of the two locations were included in the study if they were present and available to participate on the day of the test visits.

All in-patients in the acute care units of the departments of internal medicine at the two locations at the time of the doctors' test visit were visually examined only, regardless of the reason for hospitalization, or the final diagnosis.

Patients were excluded if the examinating doctors were aware of the diagnosis of alcohol disorders before submitting their written conclusions following the test visit. Possible reasons for this could be (1) if the doctors saw or read the diagnosis in the medical file, (2) if during the doctors' visit the patient mentioned to consume alcohol on a regular basis, (3) if the patient's family or visitors informed the doctors of alcohol disorders, (4) if the hospital staff informed the doctors of alcohol disorders, (5) if the general practitioners (GP) or the doctors treating the patients in the department communicated a diagnosis to the visiting doctors, or (6) if the visiting doctors discussed their impressions with one another. Also excluded were patients who had already been treated, monitored, or otherwise seen by the visiting doctors as well as patients whom the visiting doctors knew personally. Finally, patients who were identified as end-of-life patients and for whom palliative care had been indicated as well as patients aware of the study's protocol were excluded.

In the presented study, a diagnosis of AA encompassed alcohol dependence and/or alcohol abuse. The diagnosis was established by the investigators prior to both test visit.

Alcohol abuse was diagnosed based on following criteria, considered together as our "gold standard": (1) a score of more or equal to two on the standardized CAGE questionnaire [7], or (2) the criteria defined by the DSM-IV (occurrence of more or equal to three criteria) [16], or (3) a diagnosis of AA was made in the case of chronic at-risk drinking, defined as regular alcohol consumption of ≥ 20 g pure alcohol for women or ≥ 40 g for men per day [17]. One drink is considered equivalent to ten grams of pure alcohol [18].

The DSM-IV criteria were used because of their reliability and validity in diagnosing alcohol dependence [19]. The CAGE was selected over other structured questionnaires for its brevity (four questions) and simplicity (yes or no responses), and because it does not need to be self-administered. The CAGE was furthermore chosen for its advantageous specificity, sensitivity, and positive predictive value in diagnosing alcohol dependence [6,20].

Lastly, in cases where the data collected pointed to a diagnosis of AA but where the criteria were not officially met (for example, if scores were below the cut off levels or if alcohol consumption indicated in patient histories was insufficient), the respective GP was contacted in order to ascertain whether they had ever diagnosed the patients with chronic alcoholism, preferably on the basis of the reference criteria used in the presented study. In such instances the advice of the GP was followed.

The investigators had access to the medical files of the patients hospitalized during the test visits. The reason for hospitalization, the primary complaint when the patient was admitted (or the diagnosis, provided one had already been made), and any known comorbidities were established based on these medical files. The patients' drinking habits and the CAGE and DSM-IV results were determined upon admission or during the subsequent hospitalization, but before the test visits by the investigators and/or by the residents or medical students in the departments.

All data collected in order to diagnose alcohol dependence were compiled into anonymous patient documentations.

Each test visit was conducted as a group-visit over the course of one morning in each of the two hospitals.

Patients could be either in their beds or in their chairs. Hospital staff had been instructed that the patients should be wearing hospital gowns. The visiting doctors therefore saw only the patients' faces and hands. Treatments in process, such as IV drips or parenteral or enteral nutrition, were not interrupted for the visit.

The true objective of the visit was not revealed to the patients. They were told that doctors from another hospital were visiting in order to see patients in the hospital environment and to compare the two hospitals' infrastructures in terms of accommodations. Patients were told that the visit was not medical in nature and that the visiting doctors would not ask them medical-related questions. Given this perspective, patients were asked to sign a consent form allowing the visit of a committee of doctors.

The hospital staff was told that the visit was being conducted as part of a study, but the exact objective was not communicated. The doctors in charge of the patients, as well as the other doctors in the department of internal medicine in which the patients were hospitalized, were informed of the study's objective and procedures (collection of necessary data and test visit), as well as of the exclusion criteria. Consequently all doctors participating in the test visit were aware of the objective, namely arriving at a diagnosis of AA based solely on a first look at a patient. Towards this purpose, all examining doctors had received written information explaining the study's objective, the procedure for the visit, and the exclusion criteria prior to the visits.

The doctors could not undress the patients more than if they showed up for an office visit. The doctors were not allowed to communicate at length with the patients; they were only allowed to greet them. However, small talk and handshakes were permitted. Visual examination of the patients was not supposed to last longer than the time needed to judge overall appearance and briefly look at the visible parts of the body. More thorough inspections and clinical examinations were not permitted. During the visit, the doctors participating in the test were accompanied by the researchers (at least two researchers per facility) in order to ensure the correct procedure for the visit and the amount of communication among the doctors or between the doctors and the patients.

Before the visit, the participating doctors were provided with one response form per patient examined. After leaving a room, they were asked to respond to the following written questions: "Based on your observations, does the patient have AA? (Yes or no). If your answer is yes, what clinical elements have you used to reach your diagnosis?" and finally, "Was this diagnosis based on an overall impression?" On top of the response forms, the doctors were required to indicate their gender, level (senior physician, resident, or student) and number of years of postgraduate experience.

The visiting doctors' responses regarding AA in the patients they

saw during the visit were compared with the diagnoses the researchers reached according to the above selected criteria.

Data analysis was performed by STATA 11.2 (College Station, Texas 77845 USA). For each physician the first-look evaluation to identify AA was compared to the gold standard test by six parameters; sensitivity, specificity, positive and negative likelihood ratio (PLR, NLR), and positive and negative predictive value (PPV, NPV). To examine the possible influence of post-graduated experience, medical function and gender on the performance of the test, data were summarized as median (iqr) and a Kruskal-Wallis rank test (or wilcoxon rank test) was performed to compare the performance of different groups.

Results

Of 166 patients who were hospitalized in the two wards as of the respective day of the visit, nine were excluded from the study. One patient was receiving end-of-life care; for three patients, the preliminary data (taken before the test visit) were incomplete; two patients brought up the objective of the study; and for three patients, a definitive diagnosis of AA could not be established according to the gold standard.

The remaining 157 patients (75 women = 47.8% and 82 men = 52.2%, mean age 72 years) were examined by a total of 28 doctors, resulting in 1143 evaluations. On average, each doctor saw 78 patients. Of the collected evaluations, 25 were excluded: 19 because the doctors knew the patients and 6 because the information on the response forms that the physicians submitted were incomplete. The presented results are therefore based on 1118 evaluations. The prevalence of AA among the examined group of patients was 19.7% (n= 31/157) based on the gold standard.

For each participating physician, sensitivity, specificity, positive likelihood ratio (PLR), negative likelihood ratio (NLR), positive predictive value (PPV), and negative predictive value (NPV) were calculated. Because of the large variance of the results obtained within this medical population, the median values (p50) rather than the mean values were used for the analysis. The first analysis was done on the whole medical cohort, then according to medical function, clinical experience and finally to the gender of patients and physicians.

Analysis of the medical cohort reveals that the tested physicians are more specific (90.6% +/- 8.6) than sensitive (40% +/- 17.9) in detecting AA solely on the basis of a visual examination (Table 1).

The list of criteria used to arrive at the diagnosis of AA were collected and included 34 different observations, the majority of which were morphological in nature. The responses were grouped into four categories:

I. General impression and/or the following responses (listed 181 times, 39%): overall presentation, facial features, neglected hair appearance, hygiene, waxen/ashen complexion, coarse features and "resembles an alcoholic I know".

II. Classic signs (listed 162 times, 34.9%): parotid glands hypertrophy, spider angiomas, telangiectasia, rosacea, rhynophyma, icterus or subicterus, palmar or facial erythema, foetor, Dupuytren's contracture, and Cushingoid features.

III. Secondary signs (listed 92 times, 19.8%): general and nutritional condition, a possible active tobacco use or a suspicion of chronic obstructive pulmonary disease, suspected ear-nose-troat neoplasm, a tracheostomy, oral health, digital clubbing or leukonychia, smooth, reddened lips, multiple hematomas, exophtalmia or brilliant eyes, thin hair, suspected ascites, dysthymia, android obesity, and seborrheic dermatitis.

IV. Neurological signs (listed 29 times, 6.3%): psychomotor retardation, tremor or asterixis, delirium tremens, other signs of hepatic encephalopathy, physical restraints, dementia, disinhibition, nystagmus, and language trouble.

The 28 tested physicians were classed into 3 categories: senior physicians (n=8), residents (n=11), and medical students (n=9). The mean duration of post-graduated training was 15.1 years for the senior physicians and 2.2 years for the residents. All medical students were at the end of their university program.

The medical function of the examinating physician did not have a statistically significant influence on sensitivity or specificity (seniors vs. residents p=0.62 and 0.43 respectively; seniors vs. medical students p=0.63 and 0.39 respectively; residents vs. medical students p=0.59 for both sensitivity and specificity). The results are summarized in Table 2.

The results were furthermore analyzed with regards to the physicians' post-graduate years of experience (0-2 years (n = 16), 3-5 years (n = 5), > 5 years (n = 7)). Again, no statistically significant differences were found between the groups (p=0.47 and 0.63 for sensitivity and specificity respectively).

An analysis was done according to physicians' gender. Independently of their personal medical experience, no statistically significant difference between female or male doctors was found (sensitivity F vs. M p = 0.73, specificity F vs. M p = 0.1).

It was attempted to determine if the patient's gender affected the performance of the tested physicians in detecting AA. Among the 75 female patients, four had a positive diagnosis of AA, which corresponds to a prevalence of 5.3%. The prevalence was much higher in the 82 male patients, 27 of whom had a positive diagnosis (32.9%). There were insufficient positive diagnoses among female patients to allow for analysis of this subset.

Discussion

In primary care, there is an underuse of standardized tools for identifying AA, even of simple ones such as the CAGE questionnaire. The validity of clinical impressions in identifying and diagnosing alcohol abuse and alcohol dependence appears to be less than that of structured approaches, but there has been little research on this subject [6,21,22]. Nevertheless, according to our observations, the current practice in hospital settings still seems to widely employs a clinical approach. The originality of the presented study rests in its evaluation of the validity and effectiveness of an initial visual examination in establishing a diagnosis of AA. The analysis of the group of participating doctors as a whole shows that their visual examinations proved to be specific rather than sensitive. The sensitivity in detecting AA, whereas low (40%), nevertheless approaches the minimum sensitivity values of the CAGE (when used as a screening tool with test scores ≥ 2) as reported in literature (92% to 46%) [3]. It is important to remember, however, that the CAGE's sensitivity (positive results for test scores ≥ 2) varies greatly depending on the groups being studied, the methodology, and the standard criteria used [5,20]. Still, in relation only to the identification of alcohol dependence, the specificity of the visual examinations of the doctors participating in the presented study is equivalent to the specificity values reported for the CAGE questionnaire (90.6% vs 62% to 95%).

N = 28	P50 [%]	iqr [+/-]
Sensitivity	40.0	18.4
Specificity	90.6	12.7
PLR	3.9	3.7
NLR	0.7	0.2
PPV	62.5	32.1
NPV	79.2	11.4

Table 1: Sensitivity, specificity, positive and negative likelihood ratio (PLR, NLR), positive and negative predictive value (PPV, NPV) of the 28 tested physicians. Values correspond to the median ± the standard deviation.

	Seniors (n = 8)	Residents (n = 11)	Medical Students (n = 9)
Sensitivity	44.2 +/- 32.0	40.0 +/- 18.4	35.7 +/- 14.7
Specificity	90.9 +/- 9.5	88.6 +/- 15.2	90.5 +/- 11.3
PLR	5.3 +/- 11.3	3.3 +/- 4.5	3.47 +/- 1.2
NLR	0.6 +/- 0.4	0.7 +/- 0.1	0.7 +/- 0.2
PPV	67.0 +/- 27.6	75.0 +/- 33.4	55.6 +/- 19.6
NPV	81.1 +/- 17.6	78.0 +/- 13.6	80.0 +/- 7.1

Table 2: Sensitivity, specificity, positive and negative likelihood ratio (PLR, NLR), positive and negative predictive value (PPV, NPV) according to the physicians' medical function. The values given are the median values +/- interquartile range.

The sensibility and specificity of the performed first-look evaluations to recognize alcohol-disorders (40% and 90.6%, respectively) are equivalent to those of unassisted clinical judgement by a primary care physicians (41.7% and 93.1%, respectively) [15]. The visual first-look evaluation is probably less time-consuming.

Considering the high specificity of the visual first-look evaluations, it is interesting that the deciding factor cited most frequently by the examinating doctors was an overall impression and was not based on the classic clinical signs of alcoholism that are identifiable upon initial visual examination.

Surprisingly enough, the doctors' degree of experience did not improve their performance in detecting alcohol abuse. Given that complete clinical examinations were not permitted, one possible explanation for this finding is that experience plays a smaller role in analyzing the clinical signs visible on a first look.

The present study does face certain limitations. First of all, there is no valuable gold standard for identifying alcohol use disorders. Although the diagnoses were based on a combination of supporting factors, thus following good clinical practices for diagnosis [10], this integrative process can still not determine alcohol dependence or at-risk drinking without any doubt. Nevertheless, this lack of a gold standard affects all studies evaluating the various tools for detecting alcoholism. Second, the presented study was conducted in general internal medicine units of hospitals, whereas detecting chronic alcoholism is most critical in out-patient care and in primary care settings. It is probable that the alcoholic patients most likely to be hospitalized are those whose alcohol disease is more advanced and who are therefore more likely to present with easily identifiable, visible clinical signs. Furthermore, the sample size of the conducted study is not big enough to draw conclusions about the female population. It has to be kept in mind that the prevalence of alcoholism is different in the general population than it is in a population of in-patients. It is therefore possible that a selection bias limits the general applicability of the presented observations to the practice of primary care medicine. Finally, the doctors participating in the test were specifically asked to give their opinion as to whether the persons they were seeing for the first time suffered from alcohol abuse. The study's objective therefore led the doctors to pay closer attention to detect possible alcohol abuse.

Although its specificity rivals that of CAGE in detecting alcohol dependence within the limitations listed above, based on the presented study the sensitivity of a first-look visual examination is not sufficient to allow screening for alcohol problems. This is probably especially true for early identification for less severe alcohol problems. Yet especially for persons with less severe alcohol problems brief interventions on an out-patient basis have proven effective to reduce alcohol consumption. Given these considerations, it is necessary to at least use tools with a high sensitivity, such as the AUDIT [6,20], which could be used as self-report to increase detection rate [23].

In conclusion, the sensitivity of rapid visual inspection for diagnostic of alcohol abuse is too low to be appropriate for screening, physicians should rather use self-report AUDIT. Visual first-look evaluation is specific and clinical experience had no impact on performance. The reported performance in diagnosing alcohol abuse of unassisted clinical screening made by primary care physicians is similar to our reported performance of a visual first-look screening made by medical doctor with less than 2 years of clinical practice [15].

Competing Interests

All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Declaration of Interest

None

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