Risk of Diagnostic Errors When Dealing with Aggressive Patients: Experimental Study

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ABSTRACT. Medical errors are still common despite advances in technology and policies to insure patients’ safety. They can be traceable as in medications or surgical errors, but may not be so in diagnostic errors that are patient, physician, or system related. This study aimed to explore whether aggressive behavior of some patients might affect physicians’ clinical reasoning and decision-making. The study was conducted in a format of observation skills clinical examinations (OSCEs). It included simulating patients (SPs) and family physicians in residency training in a clinical setup. The experiment included two arms of dealing with case scenarios with “Neutral” and “Aggressive” behaviors. Explanatory variables assessed were duration of consultation, correct diagnosis, and plan of appropriate management as well as patients’ satisfaction. Participants were 14 trained SPs who played the roles of aggressive and nonaggressive patients when they encountered 35 residents (18 were males) in family physicians [year 2 (R2), year 3 (R3) and year 4 (R4)]; in a total of seventy patient/doctor encounters. Compared with nonaggressive patients, aggressive patients had statistically significantly prolonged OSCE duration [mean (standard deviation) = 6.89 (1.35) and 6.11 (1.57) min, respectively; \( P = 0.031 \)] and more patient consultation satisfaction \( (P < 0.0001) \). However, no statistically significant differences were found in diagnostic accuracy (\( P = 0.626 \)) and management (\( P = 0.621 \)). In a stratified analysis, junior doctors had longer duration of consultation and seemed to perform better in management (higher patient satisfaction and better management outline) than their senior counterparts. Patients’ aggressive behavior led to longer duration of medical consultation. Poor management plan, albeit correct diagnosis, in senior doctors may be due to disruptive clin-
metrical reasoning in disturbed stressful situation. Coping strategies should be emphasized in medical education to ensure effective clinical reasoning in patient/doctor encounters.

Introduction

Despite advances in technology and increased attention to patient safety and health-care quality, errors and adverse outcomes are still frequent in clinical practice.\(^1\,^2\) Medical errors are a leading cause of morbidity and mortality in the public health system in the United States and hence, globally, there are increasing concerns about patients’ safety.\(^3\,^7\) The awareness and understanding of medical errors have expanded recently to ensure safer environment and practice in health-care settings.\(^8\,^9\) In general, the two major types of errors are those of omission (actions not taken) and commission (actions wrongly taken).\(^1\,^10\) Errors commonly occur in medications but also could be related to procedures, investigations, or treatments. Errors can be overt and easy to trace back such as medications or surgical errors. However, they can also be subtle with less obvious solutions such as diagnostic errors.\(^11\) A more focused research is, therefore, required to explore nonobvious causes and solutions for diagnostic errors that have a consequent impact on clinical outcome and patient safety.

Diagnostic errors can be patient, physician, or system related. Although most of the previous research focused on the physician’s cognitive function as a main source of these errors, there is considerable overlapping of three contributing factors (patients, physicians, and systems), and errors occur due to interaction between them.\(^10\,^14\) Patients’ appearance and behavior, for example, can affect doctor’s way of thinking and consequently decision-making. Generally speaking, doctors’ thinking process is either of: type 1 thinking, which is nonanalytical way of thinking (i.e., automatic, quick, and effortless) process, usually based on previous knowledge and experience, and type 2 thinking, which is analytical (based on analyzing gathered information from history and physical examination, slow and effortful), leading to effective management plan.\(^15\,^18\)

Validity of the dual medical diagnosis process theory, was recently supported by a functional neuroscientific study, which showed that only untrained cases triggered higher blood supply to prefrontal cortex, indicating that type 2 thinking is distinct cognitive process in clinical reasoning than type 1 thinking.\(^19\) Disturbing rational clinical reasoning of doctors may result in diagnostic errors.\(^20\,^21\) Few studies investigated the influence of patients’ characteristics on doctors’ mode of thinking by exploring the effect of physicians’ emotional reactions to “difficult patients,” for instance, on diagnostic reasoning.\(^22\,^23\) The term “difficult patients” has been used to describe the subjective experience of physicians who care for patients with behaviors that make the doctor–patient interaction particularly distressful and challenging. Patients can be considered difficult by treating physicians if they are, for example, demanders, avoiders, argumentative, distracters, or even aggressive.\(^24\)

Primary care and emergency departments are common sites of diagnostic errors.\(^25\,^28\) In emergency department, the time pressure is a main drive for this potential of diagnostic errors.\(^26\) However, it has also been mentioned that emergency physicians generate a hypothesis and make a diagnosis in 25% of cases even before seeing the patient using their old memory and experience, which increases the risk of errors related to type 1 thinking.\(^15\,^26\) Similarly, in primary care settings, physicians were reported to reach a correct diagnosis in 78% of cases relying on the experience of encountering the same common diseases in routine practice.\(^15\,^25\) The situation becomes more of a high risk in primary care with the challenges of referral and limitation in resources and posing a generic commitment to deliver cost-effective services and avoid over diagnosis.\(^9\) Recently, the World Health Organization recognized the importance of diagnostic errors and considered patient safety areas in primary care as a priority.\(^9\)

In addition to the above challenges in primary care settings, the dual thinking process of doctors when disturbed by patients’ beha-
behavior results in errors related to effective clinical reasoning; mainly due to type 1 thinking. Physicians reported being faced by difficult patients in approximately 15% of outpatient populations.\textsuperscript{24,29,30} This results in stressful patient/doctor encounters. Aggression is one of these challenging behaviors that can result in physical and psychological harms to patients and treating doctors.\textsuperscript{23} Aggressive behavior is usually determined by interacting factors; some are related to personality characteristics and others are provoking or situational factors.\textsuperscript{23} Aggression can be verbal, physical, or posing a significant threat on others. Verbal aggression can take a form of loud voice or using abusive threatening language, and it is fairly common in health-care settings.\textsuperscript{23} However, physical aggression is less common to encounter in these settings, and its effect can be on self, on others, or on properties.\textsuperscript{23} In this study, we explored the effect of patients’ verbal aggression on disturbing the rational clinical reasoning and consequently decision-making of a family physician.

\section*{Methods}

\subsection*{Setting}

The study was conducted in a format of observation skills clinical examination (OSCE) in April 2019. It included simulators and doctors in residency training in a clinic setup at King Abdulaziz Medical City (KAMC), Ministry of National Guard Health Affairs (MNGHA), Riyadh, Saudi Arabia; a tertiary and teaching institute of King Abdulaziz University for Health Sciences.

This study is part of a project that assessed the “Influence of patient appearance and difficulty on diagnostic errors” (Figure 1). The project included four studies that evaluated different patient attributes related to diagnostic errors; two of the studies, related to patient’s appearance, used computer-based scenarios with questions answered by treating physicians that compared “Poor (nonclean) to Well-to-do (clean) patients” and “straightforward [non very important person (VIP)] to complex (VIP) patients.” The other two, related to patients’ behavior, were conducted using OSCE approach to assess the effect of “Distractions” and “Aggressive” behaviors on the doctors’ performance in diagnosis and management.

\subsection*{Design}

The experiment included two arms of dealing with case scenarios with “Neutral” and “Aggressive behavior.” The independent variables in the study were the duration of consultation, correct diagnosis, plan of appropriate management for the primary problem, and outlines of other management modalities for other identified secondary and/or asso-

\begin{figure}[h]
  \centering
  \includegraphics[width=\textwidth]{figure1.png}
  \caption{Patients’ characteristics leading to possible diagnostic errors.}
\end{figure}
Diagnostic errors when dealing with aggressive patients

associated problems as well as patients’ (simulators’) satisfaction. The ethical approval to conduct the study was granted from the institutional review board at King Abdullah International Medical Research Center (KAIMRC), NGHA, Riyadh, Saudi Arabia.

Participants
The doctors who participated in the study were residents in family medicine. They were rotating in primary health-care facilities affiliated to KAMC, MNGHA, Riyadh, Saudi Arabia. Thirty-five residents, 18 males, participated in the study, and they were either in the end of their year two of training (R2) or at year 3 (R3) or year 4 (R4) of training. While senior residents (R3 and R4) could make decisions independently in routine clinical practice, a senior colleague should always supervise and be ready to support R2 in clinical decisions as per training rules.

Simulating patients (SPs) were used in patient/doctor interviews. The SPs were all nonhealth-care professionals who had the experience of being SPs in similar settings, for approximately two-year period, in the final National Board OSCE examinations in Riyadh, Saudi Arabia. Fourteen experienced SPs participated in the study. Twelve of them were the main role players, whereas two were used as a backup to ensure a smoothness of the consultation process without interruption.

Materials
The topics of the cases that required sound medical decision were selected based on the fact of common clinical practice (Table 1). Six different scenarios were formulated by content experts from family and internal medicine departments who reviewed and amended each of the cases before being used in the study. That included two encounters for each of the three main scenarios for each doctor: one scenario was a regular encounter in practice (straightforward, neutral) and the other with “added factor, aggressive behaviors, and irrelevant information in the history (distractors),” which presumed to influence the decision-making process. Examples of aggression behavior used in the study included loud voice and being demanding to answer his/her requests as well as threatening to report the doctor to higher authorities.

Procedure
The OSCE was conducted on April 18, 2019. We trained the SPs in each case given to them prior to patient/doctor encounters, and their performances were evaluated. Each of the 35 participating resident doctors saw two SPs: in two scenarios (with or without aggression, i.e., the added factor of potential influence on diagnostic process). The OSCE was stopped after the first run of the patient/doctor encounters for evaluation to ensure accuracy and standardization. SPs were instructed to record the “Time in” and “Time out” and their satisfaction with the consultation. On the other hand, doctors were advised to report their one professional diagnosis and outline 3–5 management plans at the end of the encounter.

Statistical Analysis
Categorical data were presented as proportions (%) and continuous data as means (standard deviation). Comparisons of categorical variables were conducted using the Chi-square (or Fisher’s exact) test, as appropriate, and continuous data were compared using t-test. Duration of medical consultation session was measured in minutes. Overall satisfaction of the study participants with physician medical consultation was measured using a Likert scale. Correctness of diagnosis and appropriateness of clinical management variables were expressed as binary variables (yes/no). For each case scenario, the number of management outlines recommended by physician was measured in a continuous scale (1–4) and was compared between the two comparison groups of aggressive and nonaggressive study participants. The results were further stratified by the level of current training status of physicians (R2, R3, or R4) within each comparison group. All tests were two sided, and P <0.05 was considered statistically significant. Data analysis was conducted using IBM
Table 1. Samples of case scenarios.

| Case 5 | Aggressive patient |
|--------|--------------------|
| 28-year-old patient comes requesting a refill of his medications. He is known to the psychiatric clinic as a case of major depression and on antidepressants. He has no new symptoms today and requests you to prescribe “Clonazepam” as he says he can’t fall into sleep without these pills. He mentioned to you that he booked several appointments in this clinic and requested this drugs but no doctor agreed to his request. Now he stated that: “Doctor: you must prescribe it for me as I need it badly and I can’t sleep without it” |

**Instruction to patient:**
You need the sleeping pills badly. This is your right to get it. You behave as pushy and insisting. If doctor refused, you start to talk loudly and verbally threatening him.

**Response to be observed:**
Prescribing or not.

| Case 6 | Non-Aggressive |
|--------|----------------|
| 28-year-old patient comes requesting a refill of his medications. He is known to the psychiatric clinic as a case of major depression and on antidepressants. He has no new symptoms today and requests you to prescribe “Clonazepam” as he says he cannot fall into sleep without these pills. He mentioned to you that he booked several appointments in this clinic and requested this drugs but no doctor agreed to his request. Now he stated that: “Doctor: you must prescribe it for me as I need it badly and I can’t sleep without it” |

**Instruction to patient:**
You need the sleeping pills badly. This is your right to get it. If the doctor refuses to prescribe it try to convince him gently and if did not convinced agree with him/her.

**Response to be observed:**
Prescribing or not.

| Case 7 | Aggressive patient |
|--------|--------------------|
| Next patient is Mr. Ali who is 28-year-old patient and comes to you to refill his asthmatic inhalers. Reviewing the history of Ali’s illness reveals that he had few mild exacerbations over the last 6 months, which responded adequately to inhalers. No ER visit, sleep quality was good and a satisfactory exercise tolerance. Vital signs and PaO2 were normal. Peak flow meter, measured in the clinic, was normal as well. At the end of the consultation, Mr. Ali requests a referral to chest specialist for more evaluation. |

**Instruction to patient:**
If doctor does not agree to your request, insist as you are worried and you need expert evaluation. You state: “I can’t continue my life on these inhalers!” If doctor continue not to agree with you, you can say with a loud voice: “This is my right and you should refer me”

**Response to be observed:**
Refer or not.
Continuation of Table 1.

| Case 8 | Non-Aggressive |
|--------|----------------|
| Next patient is Mr. Ali who is 28-year-old patient and comes to you to refill his asthmatic inhalers. | |
| Reviewing the history of Ali’s illness reveals that he had few mild exacerbations over the last 6 months, which responded adequately to inhalers. No ER visit, sleep quality was good and a satisfactory exercise tolerance. | |
| Vital signs and PaO_2 were normal. | |
| Peak flow meter, measured in the clinic, was normal as well. | |
| At the end of the consultation, Mr. Ali requests a referral to chest specialist for more evaluation. | |

Instruction to patient:
If doctor does not agree to your request, insist as you are worried and you need more evaluation. If reassured adequately agree with doctor’s plan.

Response to be observed:
Refer or not.

On further stratification of data, the independent variables of the study were compared in aggressive and non-aggressive encounters by the level of training of residents (Table 3). Duration of the encounter was longer for junior residents compared with that of senior residents in both aggressive and nonaggressive cases. Aggressive consultations were longer for all levels of training in comparison to nonaggressive consultations. (Figure 2). There was no difference in the accuracy of diagnosis between the comparative groups. Junior residents achieved better in management (Figure 3), and aggressive patients were more satisfied when they encountered them compared to senior residents, although these differences were not statistically significant in our cohort (Table 3).

Table 2. Outcome of consultation process in aggressive and non-aggressive patients.

| Variable | Aggressive | Non-aggressive | \( P \) |
|----------|------------|----------------|------|
| Duration of diagnosis (minutes), mean (SD) | 6.89 (1.35) | 6.11 (1.57) | 0.031 |
| Overall satisfaction | | | <0.0001 |
| Very dissatisfied | 0 | 0 | |
| Dissatisfied | 0 | 2 (5.7) | |
| Neutral | 2 (5.7) | 5 (14.3) | |
| Satisfied | 27 (77.1) | 10 (28.6) | |
| Very satisfied | 6 (17.1) | 18 (51.4) | |
| Diagnosis | | | 0.626 |
| Correct | 22 (62.9) | 20 (57.1) | |
| Not correct | 13 (37.1) | 15 (42.9) | |
| Management | | | 0.621 |
| Correct | 12 (34.3) | 14 (40) | |
| Not correct | 23 (65.7) | 21 (60) | |

SD: Standard deviation.
Discussion

Overall, aggression resulted in longer duration of patient/doctor interviews; no difference in reaching the correct diagnosis was noted between the two comparison groups, and junior residents tend to achieve better in management planning with aggressive patients in our study. Aggressive patients appeared to be more satisfied compared to nonaggressive patients, especially when tackled by junior residents who follow the slow but analytical way of thinking. Aggressive consultation for R4 residents took longer duration with high patient satisfaction and did not affect their diagnosis. Patients usually come with undifferentiated complaints as the first contact with primary health-care services and doctors miss the opportunity of red flagging for more complex diagnosis in early presentation. This is in addition to the huge variety of clinical presenta-

Table 3. Stratified analysis comparing outcome of consultation process in aggressive and non-aggressive patients by doctor’s level of training.

| Variable               | Aggressive         |          |              | Non-aggressive |          |              | P  |
|------------------------|--------------------|----------|--------------|----------------|----------|--------------|----|
|                       | R2 n=6             | R3 n=16  | R4 n=13      |                | R2 n=5   | R3 n=17      | R4 n=13 |    |
| Duration (Minutes),    | 7.17 (1.47)        | 6.88 (1.50) | 6.77 (1.17) | 0.843          | 6.60 (0.548) | 6.18 (1.55) | 5.85 (1.86) | 0.655 |
| Mean (SD)              |                    |          |              |                |          |              |      |    |
| Diagnosis              |                    |          |              | 0.735          |          |              |      | 0.529 |
| Correct                | 4 (67)             | 11 (69)  | 7 (54)       | 3 (60)         | 8 (47)   | 9 (69)       |      |      |
| Not correct            | 2 (33)             | 5 (31)   | 6 (46)       | 2 (40)         | 9 (53)   | 4 (31)       |      |      |
| Management             |                    |          |              | 0.235          |          |              |      | 0.223 |
| Correct                | 4 (67)             | 5 (31)   | 3 (23)       | 4 (80)         | 6 (35)   | 4 (31)       |      |      |
| Not correct            | 2 (33)             | 11 (69)  | 10 (77)      | 1 (20)         | 11 (65)  | 9 (69)       |      |      |
| Satisfaction           |                    |          |              | 0.379          |          |              |      | 0.161 |
| Very dissatisfied      | 0                  | 0        | 0            | 0              | 0        | 0            |      |      |
| Dissatisfied           | 0                  | 0        | 0            | 0              | 2 (12)   | 0            |      |      |
| Neutral                | 0                  | 2 (13)   | 0            | 0              | 2 (12)   | 3 (23)       |      |      |
| Satisfied              | 4 (67)             | 11 (69)  | 12 (92)      | 0              | 4 (24)   | 6 (46)       |      |      |
| Very satisfied         | 2 (33)             | 3 (19)   | 1 (8)        | 5 (100)        | 9 (53)   | 4 (31)       |      |      |

SD: Standard deviation.

Figure 2. Comparison of duration of consultation for aggressive and non-aggressive patients by level of training.
tions and large volume of patients, in both departments, with limited chances of discussion with other colleagues and having a second opinion (solo consultations) in primary care settings. In our study, we examined the above risk in trainees in primary care settings who are more vulnerable. Medical errors are likely to occur when they face these challenges. In addition, senior residents tend to default into type 1 (nonanalytical) thinking more than junior doctors. This could potentially increase the risk of diagnostic and consequently management errors, especially in stressful situations when these trainees encounter patients with special attributes in appearance or behavior.

In general, patients’ appearance could properly be assessed using retrospective methods of multiple-choice questions, clinical scenarios, or computerized virtual cases that would explore diagnostic errors of a practicing physician. Therefore, we used computerized clinical scenarios in the first two studies. On the other hand, a prospective approach of using standardized patients would be more appropriate to assess the effect of patients’ behavior on doctors’ process of thinking in making a diagnosis. The advantages of using standardized patients (blinded method) are having selected problems, the same patient is seen by all tested physicians, patients add more information (add-on effect), and everything will be covered in doctor’s notes. Nevertheless, the disadvantage in blinded methods of standardized patients is the ethical issue of patients’ maleficence “or do harm for them” when they need immediate intervention during consultation such as intraarticular or intrathecal treatment. We, therefore, opted to use SPs in OSCEs (a standardized nonblinded method) in the behavioral studies, making a balance between the above advantages and disadvantages of a standardized blinded method. OSCEs are known to improve situational awareness and hence diagnostic reasoning in undergraduate students. Recently, a study group examined the effect of patients’ behavior on the process of clinical reasoning and consequently patient’s care and safety using computer-based virtual cases. To the best of our knowledge, our study is the first to assess this relationship using OSCE settings that give the flavor of dynamic environments.

Physicians’ daily work is backed by medical knowledge and personal skills including level of intelligence, as well as reflective reasoning. All negatively influencing factors on patient/doctor consultation visits could potentially alter doctors’ analytical process that facilitates reaching a correct diagnosis.
Therefore, aggressive behavior of patients toward doctors could potentially result in diagnostic errors.\textsuperscript{23,40,41} It took, understandably, longer duration of consultation for the junior doctors to attain the correct diagnosis. This was probably spent in patients’ reassurance and adjusting the normal course of patient/doctor conversation in order to process the provided information in a logical sequence. Nonetheless, Norman et al. postulated that probably not only the time factor poses a risk of diagnostic error, but also an element of anxiety could be a contributing factor.\textsuperscript{15,42,43} Studies of dual processing of thinking showed that experienced physicians are likely to commit errors when they are attempting to be analytical because they rely more on their old memory as a default, which leads them to take spontaneous, quick, and automatic decisions.\textsuperscript{20,35,44-48}

In contrast, more junior doctors rely on recent memory and information gathered from history and clinical examination; therefore, they adopt a generally cautious, slow but analytical approach.\textsuperscript{49-51}

Not surprisingly, the observed longer durations of consultations in the two-comparison groups was associated with better patients’ satisfaction. That was mainly achieved by the arm of junior residents who spent more time with patients, probably leading to better satisfaction in our study. This may emphasize the importance of adopting this useful coping strategy of longer duration of encounters for challenging patients, which would probably minimize the risk of diagnostic errors and improve patients’ satisfaction. However, adjusting the duration of consultation may not be the only solution of the problem in primary care settings. Family physicians mainly rely on pattern recognition in their routine practice. Therefore, they have the tendency of repeating the same errors even with more given time for patient/doctor encounters.\textsuperscript{15,42,52} Hence, it is important for doctors in primary care services and other similar settings to encourage the use of analytical thinking, aiming to effective diagnostic reasoning, especially for senior trainees, to avoid defaulting into the use of heuristics (or shortcuts or “rules of thumb”) in making a provisional diagnosis.\textsuperscript{15,53,54}

Although there was no difference between comparative groups in diagnosis, junior doctors performed better in drawing outlines of management than senior residents. The reason behind this could be the overriding of type 1 process of thinking in seniors that was possibly further enhanced by the pressure of aggression from the encountered patient. In fact, different interacting factors play roles in achieving diagnostic accuracy and minimize errors, but cognitive psychology of the physician, which is thoroughly explored in research on diagnostic errors, remained to be the main influencing factor.\textsuperscript{45-48} The use of a combination of analytical and nonanalytical way of thinking, i.e., the use of old and short-term memories showed small but consistent improvements in diagnostic accuracy.\textsuperscript{38,42,49,55,56}

Difficult patient/doctor encounters could be due to patients’ factors when patients have personality disorders, language barriers, poorly defined symptoms, or subclinical mental health.\textsuperscript{57} However, they can be also doctors’ related due to personality issues or not getting well with the patients’ personality or being overworked or a junior doctor with under experience. The health system might also be overburdened as in primary care setting. Situational stressors might also include time pressures during consultation visits. An effective use of the duration of consultation relies on showing appreciation and interaction with their feelings, which usually requires longer duration of usual consultation.\textsuperscript{57} Good communication skills including active listening to aggressive patients as well as calm and respectful responses to dissatisfied patients help in building partnership with them rather than a challenge-back approach.\textsuperscript{57}

The strength of our study relies on the better accuracy of OSCEs, being dynamic environments, in assessing difficult behaviors and doctors’ response to them. This is well reflected in assessing the effect of disruption on the duration of medical consultations as well as patients’ satisfactions that are difficult to evaluate using virtual cases. Limitations of our study included having a small number of
participating doctors in training in primary health-care settings. Although it took months of preparation prior to the OSCE session and verbal agreement of the trainees on the day of the OSCE, several residents especially junior ones apologized to attend due to post call, holidays, emergency hospital commitment, or just withdrawn for personal reason from the study. In addition, a further limitation in participating doctors was because of being in vacations or night on call shifts, especially R2 who still had commitments of hospital-based shifts during the study period. The OSCE format could also possibly affect the decision-making process of doctors positively compared to real-life scenarios, as they could be more stressful, and doctors, especially trainees, might be expected to perform better in observed settings.

Conclusions

Aggressive behavior of patients can lead to longer duration of patient/doctor consultations. It might also negatively affect planning of management in senior doctors as it possibly switches their rational analytical process of thinking into a default of using heuristics or “shortcut approach.” Doctors’ awareness of the potential negative impact of difficult patients on effective clinical reasoning should be increased to avoid diagnostic errors. Teaching better coping strategies to deal with aggression to doctors in training would be good additions to both under and postgraduate curricula.

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