


# Evaluation of no-show rate in outpatient clinics with open access scheduling system: A systematic review

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## Abstract

**Background:** Patients' missed appointments can cause interference in the functions of the clinics and the visit of other patients. One of the most effective strategies to solve the problem of no-show rate is the use of an open access scheduling system (OA). This systematic review was conducted with the aim of investigating the impact of OA on the rate of no-show of patients in outpatient clinics.

**Methods:** Relevant articles in English were investigated based on the keywords in title and abstract using PubMed, Scopus, and Web of Science databases and Google Scholar search engine (July 23, 2023). The articles using OA and reporting the no-show rate were included. Exclusion criteria were as follows: (1) review articles, opinion, and letters, (2) inpatient scheduling system articles, and (3) modeling or simulating OA articles. Data were extracted from the selected articles about such issues as study design, outcome measures, interventions, results, and quality score.

**Findings:** From a total of 23,403 studies, 16 articles were selected. The specialized fields included family medicine (62.5%, 10), pediatrics (25%, four), ophthalmology, podiatric, geriatrics, internal medicine, and primary care (6.25%, one). Of 16 articles, 10 papers (62.5%) showed a significant decrease in the no-show rate. In four articles (25%), the no-show rate was not significantly reduced. In two papers (12.5%), there were no significant changes.

**Conclusions:** According to this study results, it seems that in most outpatient clinics, the use of OA by considering some conditions such as conducting needs assessment and system design based on the patients' and providers' actual needs, and cooperating of all system stakeholders through consistent training caused a significant decrease in the no-show rate.

## KEYWORDS

no-show rate, open access scheduling system, outpatient clinics

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## 1 | INTRODUCTION

No-show (also commonly called missed appointments or non-attendance) is defined as unexpected absence of patients in their prebooked appointments.<sup>1-3</sup> Increasing the no-show rate has adverse effects on both healthcare providers and patients. According to the study conducted by Mazaheri et al., which was conducted with the aim of classifying the evaluation criteria of appointment scheduling systems, it was found that most of the measures are related to patients, which indicates the importance of the patient's perspective in evaluating these systems.<sup>4</sup> In addition, satisfaction with waiting time, service time, and clinic environment have a significant impact on overall patient satisfaction.<sup>5</sup> The effects of patient outcomes include reduced access to services, loss of appointment slots, break continuity of care, and patient dissatisfaction. Increasing the work of clinic and staff, increasing costs, and reducing the clinic's revenue and efficiency are also factors that affect the providers.<sup>6-10</sup>

Despite the use of actions such as sending a reminder, using phone calls and even charging no-show fees, missed appointment is a persistent healthcare problem in most outpatient clinics.<sup>8,11-15</sup> No-show rates have been variable in studies. In some studies, this rate is reported between 12% and 42%. In general, and outpatient clinics, it can even reach around 50%, which is unavoidable.<sup>16-20</sup> A common useful strategy to solve the problem of no-show is the use of open access scheduling (OA), which means booking appointment based on patient preference on the same day or a few days after that time.<sup>21-23</sup> The time interval between taking appointment and the time of the visit with a doctor has been reduced with this system. Thus the patients are less likely to forget their appointment and

are more likely to attend the clinic. In addition, the system allows the patients to meet their doctor at the appropriate time. This will increase the patients' satisfaction with and loyalty to the clinic.<sup>24-27</sup>

However, in some studies, the exact effect of this system on the reduction of the no-show rate is not clear. The results of the implementation of this system and its impact on the no-show rate are different.<sup>28-30</sup> This study was performed with the purpose of investigating the effect of OA on the rate of no-show of patients in outpatient clinics.

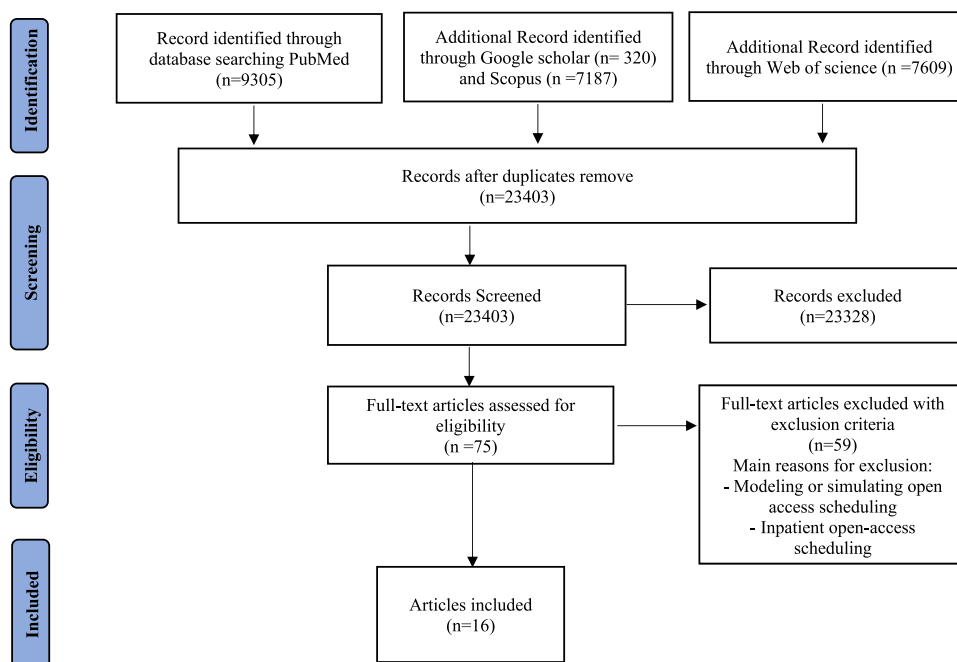
## 2 | MATERIALS AND METHODS

### 2.1 | Study design

This study has been conducted based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist.<sup>31</sup> The articles in English were searched based on the title and abstract keywords using PubMed, Scopus, and Web of Science databases and Google scholar search engine until July 23, 2023. MeSH keywords and phrases were employed to explore the databases.

### 2.2 | Strategic search

As shown in Figure 1, the articles search strategy was as follows: Booking system\* OR book system\* OR scheduling system\* OR schedule system\* OR scheduling software\* OR schedule software\* OR booking software\* OR book software\* OR appointment making\*



**FIGURE 1** Flow diagram of the literature search and study selection.

**TABLE 1** The instrument used for measuring the quality of studies.

Quality evaluation criteria	Score
(1) The study objectives have been clearly stated.	1
(2) All scheduling system assessment criteria have been clearly defined.	1
(3) All assessment criteria have been reported quantitatively.	1
(4) Data collection method has been clearly described.	1
(5) Study population has been clearly specified.	1
(6) Intervention has been clearly explained.	1
(7) Scheduling system features have been expressed in a transparent situation.	1
(8) Study design has been clearly explained.	1
(9) Study setting has been clearly marked.	1
(10) Study limitation has been fully reported.	1
Maximum points	10

OR making appointment\* OR Electronic booking OR electronic schedule\* [Title/Abstract/Keywords].

Searching was completed by scanning bibliographies of the selected articles. Two reviewers independently investigated all titles and abstracts. The disparities between the two reviewers were resolved by consensus involving a third reviewer. Both authors review the same articles for data extraction. Data were extracted from the selected articles about such issues as study design, outcome measures, interventions, results, and quality score. Also, to prevent missing the relevant studies, the reference lists of relevant systematic review studies were examined.<sup>32,33</sup>

## 2.3 | Quality assessment

The survey studies showed that there was no tool to assess the quality of OA studies. Therefore, a 10-item quality assessment tool (Table 1) was developed based on the two reviewed studies.<sup>34,35</sup> Each of the quality assessment items was measured with a score of 0 or 1.

## 3 | RESULTS

### 3.1 | Study selection

A total of 23,403 articles were extracted from the online databases. Initial testing of titles and abstracts gave 75 articles eligible for further full-text review. By full-text reviewing articles, 59 articles were excluded, and 16 papers were selected for detailed analysis.

### 3.2 | Study characteristics

The characteristics of these studies are shown in Table 2. The specialized fields included family medicine (62.5%, 10), pediatrics (25%, four), internal medicine (12.5%, two), ophthalmology, podiatric, geriatrics, and primary care (6.25%, one). Regarding the study design, the studies were before-after (68.75%, 11), controlled trial, case-series, case-control, cross-sectional, and cluster randomization (each 6.25%, one) designs, respectively. Most of the interventions were related to the implementation of OA (87.5%, 14). Just in one case, the type of intervention was the no-show rate comparison between the two cases (with OA) and control (without OA) groups. Also, in another study, the type of intervention was changing the amount of lead time and calculating the no-show rate in OA.

### 3.3 | Impact of OA on the rate of no-show of patients in outpatient clinics

According to the main finding of this study, of 16 articles, 10 papers (62.5%) showed a significant decrease in the no-show rate. In four articles (25%), the no-show rate was not significantly reduced. In two papers (12.5%), there were no significant changes.

Table 3 shows the study settings of the 16 articles. The quality scores were categorized based on 10 selected items, represented in Table 4. From a total of 16 articles, 10 articles (62.5%) had the highest quality (they had a score of 8 or above).

## 4 | DISCUSSION

### 4.1 | Principal findings

Due to the lack of systematized review studies on no-show rate in OA, this study evaluated the rates of no-show in the outpatient healthcare clinics using OA. Briefly, out of 16 selected articles, 10 articles revealed a significant reduction in the no-show rate. In other articles, the improvement in the rate of no-show has been reported as insignificant or unchanged. The results showed that using OA could be much more effective in the reduction of patient absence. In two out of 16 reviewed articles, outcomes related to the no-show rate have been offered qualitatively, while in other studies this rate has been reported quantitatively.

In some studies, insurance status has been introduced as an indicator for no-show rate in OA.<sup>43,47</sup> As represented in study, having the insurance is one of the reasons for no-show rate reduction in the studied populations.<sup>40</sup> Another study reported that the insurance status is the reason for insignificant decrease in no-show rate.<sup>48</sup> It seems that insurance status is closely related to the patients' financial condition. It is not surprising that patients' financial difficulties and high medical expenses along with the absence of insurance cause patients not to attend the clinics (Table 3).

TABLE 2 The characteristics of the studies reviewed.

Reference	Source	Specialty	Study design	Outcome measures	Intervention	Result	Quality score
[34]	Stewart Cameron 2010	Family medicine	Before-after	<ul style="list-style-type: none"> <li>No-show rate</li> <li>Waiting time</li> <li>Patient volume</li> </ul>	Implementation of open access scheduling	<ul style="list-style-type: none"> <li>Monthly "No-show" decreased (from an average of 3.33% to 1.89%)</li> <li>The "Waiting time" decreased (from 13.7 to 3.6 days)</li> <li>The "Patient volume" remained unchanged (less than 0.1%)</li> </ul>	8
[35]	Ateev Mehrotra 2008	Family medicine Internal medicine	Case-series	<ul style="list-style-type: none"> <li>No-show rate</li> <li>Appointment availability</li> <li>Third available appointments</li> </ul>	Implementation of open access scheduling	<ul style="list-style-type: none"> <li>The "No-show rate" did not change (remained 14%)</li> <li>The proportion of patients or staff "Appointment availability" did not improve significantly (48% preintervention vs. 51% postintervention, and 38% preintervention vs. 59% postintervention, respectively)</li> <li>The average "Third available time" increased significantly (for short visits from 8 to 11 days and for long visits from 14 to 29 days)</li> </ul>	8
[36]	E. Paul Cherniack 2007	Geriatrics	Before-after	<ul style="list-style-type: none"> <li>No-show rate</li> <li>Patient visits</li> <li>Waiting time</li> <li>Patient satisfaction</li> </ul>	Implementation of advanced access scheduling	<ul style="list-style-type: none"> <li>The rate of "Missed appointments" reduced significantly (from 18% to 11%)</li> <li>The "Patient visits" was not reduced significantly (8%)</li> <li>The "Waiting time" decreased (data not provided)</li> <li>55% of samples preferred to use advanced access than the previous system</li> </ul>	5
[37]	Jeffrey R. Steinbauer 2006	Family medicine	Before-after	<ul style="list-style-type: none"> <li>No-show rate</li> <li>Monthly visits</li> <li>Patient, provider, and staff satisfaction</li> <li>Third available appointments</li> <li>Call volume</li> </ul>	Implementation of open access scheduling	<ul style="list-style-type: none"> <li>The "No-show rate" did not change significantly (remained 8%)</li> <li>"Monthly visits" increased (20%)</li> <li>"Patient, provider, and staff satisfaction" improved (data not provided)</li> <li>The average "Third available time" changed (from 17 to 1 day)</li> <li>"Call volume" increased (33%)</li> </ul>	4
[38]	Mary E. O. Connor 2006	Pediatrics	Cluster randomization	<ul style="list-style-type: none"> <li>No-show rate</li> <li>On-time immunization rate</li> </ul>	Implementation of open access scheduling	<ul style="list-style-type: none"> <li>The "No-show rate" was decreased (30% in OA future visit group and over than 50% in OA same day group)</li> </ul>	9

TABLE 2 (Continued)

Reference	Source	Specialty	Study design	Outcome measures	Intervention	Result	Quality score
[39]	Victoria Mitchell 2008	Family medicine	Before-after	<ul style="list-style-type: none"> <li>- Continuity of care</li> <li>- No-shows</li> <li>- Backlog</li> <li>- Patient satisfaction</li> <li>- Working conditions</li> <li>- Physician morale</li> <li>- Patient care</li> </ul>	Implementation of advanced access scheduling	<ul style="list-style-type: none"> <li>- "On-time immunizations rate" improved (25% between the baseline group and the two OA groups)</li> <li>- "Continuity of care" in OA same day group (60%) was less than in OA future visit group (75%)</li> <li>- "No-shows" was decreased (data not provided)</li> <li>- "Backlog" was eliminated (data not provided)</li> <li>- "Patient satisfaction" increased (93%)</li> <li>- "Working conditions" improved (data not provided)</li> <li>- "Physician morale" increased (data not provided)</li> <li>- "Patient care" improved (data not provided)</li> </ul>	6
[40]	David G. Bundy 2005	Family medicine Pediatrics	Before-after	<ul style="list-style-type: none"> <li>- No-show rate</li> <li>- Appointment delay</li> <li>- Patient satisfaction</li> <li>- Continuity of care</li> <li>- Staff satisfaction</li> </ul>	Implementation of open access scheduling	<ul style="list-style-type: none"> <li>- The "No-show rate" was reduced (5%)</li> <li>- "Appointment delay" was reduced (from 36 to 4 days)</li> <li>- "Patient satisfaction" improved (16%)</li> <li>- "Continuity of care" did not change significantly (13%)</li> <li>- "Staff satisfaction" neither improved nor declined (data not provided)</li> </ul>	9
[41]	Kevin J. Bennett 2009	Family medicine	Before-after	<ul style="list-style-type: none"> <li>- No-show rate</li> <li>- Third next available appointments</li> <li>- Continuity</li> </ul>	Implementation of advanced access scheduling	<ul style="list-style-type: none"> <li>- The "No-show rate" was not reduced significantly</li> <li>- The "Third-next available appointment" decreased (from 30.7 to 9.0 days)</li> <li>- The "Continuity" increased (from 64.0% to 68.2%)</li> </ul>	7
[20]	James G. Kennedy 2003	Family medicine	Before-after	<ul style="list-style-type: none"> <li>- No-show rate</li> <li>- Patient satisfaction</li> <li>- Charges and revenues</li> <li>- Visit volumes and phone calls</li> <li>- Nursing work</li> <li>- Payer mix</li> </ul>	Implementation of open access scheduling	<ul style="list-style-type: none"> <li>- The number of "No-shows" was reduced</li> <li>- The "Patient satisfaction" improved</li> <li>- The "Charges and revenues" increased</li> <li>- The "Visit volumes" and "Phone calls" increased and remained unchanged, respectively</li> <li>- The "Nursing work" decreased</li> <li>- The "Payer mix" did not change</li> </ul>	6

(Continues)

TABLE 2 (Continued)

Reference	Source	Specialty	Study design	Outcome measures	Intervention	Result	Quality score
[28]	Francis G. Belardi 2004	Family medicine	Controlled trial	<ul style="list-style-type: none"> <li>No-show rate</li> <li>Waiting time</li> <li>Primary care physician-patient match percentage</li> <li>Panel sizes</li> <li>Patient satisfaction</li> </ul>	Implementation of advanced access scheduling	<ul style="list-style-type: none"> <li>The "No-show rate" steadily decreased (from 9.23% to 6.67%)</li> <li>The "Waiting time" decreased significantly (from 21 to 4-7 days)</li> <li>The "Primary care physician-patient match percentage" improved significantly</li> <li>The "Panel sizes" did not change significantly</li> <li>The "Patient satisfaction" remained unchanged</li> </ul>	7
[42]	James S. Wrobel 2011	Podiatric	Retrospective case-control	<ul style="list-style-type: none"> <li>No-show rate</li> <li>Panel size</li> <li>Waiting time</li> </ul>	Comparison of outcome measures between case facilities (open access) and control facilities (no open access)	<ul style="list-style-type: none"> <li>The "No-show rate" was not reduced significantly (case: 8.6% vs. control: 9%)</li> <li>The "Panel size" remained unchanged</li> <li>The "Waiting time" increased significantly (case: 9.6% vs. control: 8.9%)</li> </ul>	8
[43]	Shakira Lynn 2016	Primary care clinics	Before-after	<ul style="list-style-type: none"> <li>No-show rate</li> <li>Third next available appointments</li> </ul>	Implementation of open access scheduling	<ul style="list-style-type: none"> <li>The "No-show rate" decreased (from 42% to 27%)</li> <li>The average of "3rd next available appointments" were reduced (from 8.9 to 4.3 days)</li> </ul>	8
[23]	Michael J. McMullen 2015	Ophthalmology	Cross-sectional retrospective	<ul style="list-style-type: none"> <li>No-show rate</li> </ul>	Examining the correlation between lead time and no-show rate in open access scheduling	<ul style="list-style-type: none"> <li>The "No-show rate" decreased as appointment lead time decreased in open access scheduling</li> </ul>	9
[44]	Clark DuMontier 2013	Family medicine	Before-after	<ul style="list-style-type: none"> <li>No-show rate</li> <li>Number of active patients</li> </ul>	Implementation of advanced access scheduling	<ul style="list-style-type: none"> <li>The "No-show rate" was reduced significantly in both groups (from 30% to 17% and from 10% to 7%)</li> <li>The "Number of active patients" was not reduced significantly in one group (from 88% to 85%) and increased significantly in another group (from 54% to 75%)</li> </ul>	8
[45]	Sanjeev Y. Tuli 2010	Pediatrics	Before-after	<ul style="list-style-type: none"> <li>No-show rate</li> <li>Overall satisfaction</li> <li>Resident productivity and continuity</li> <li>Clinical staff cost</li> <li>Patient access</li> </ul>	Implementation of advanced access scheduling	<ul style="list-style-type: none"> <li>The "No-show rate" was not reduced significantly</li> <li>The "Overall satisfaction" improved significantly (to 90%)</li> <li>The "Resident productivity and continuity" improved significantly</li> </ul>	9

TABLE 2 (Continued)

Reference	Source	Specialty	Study design	Outcome measures	Intervention	Result	Quality score
[46]	Stephen D. Mallard 2004	- Pediatrics - Internal medicine - Family medicine	Before-after	- No-show rate - Waiting time - Number of new patients - Provider Productivity	Implementation of open access scheduling	- The "Clinical staff costs" decreased (22%) - The "Patient access" increased significantly  - No-shows were significantly reduced under same-day scheduling - The "Waiting time" decreased significantly (from 46 to 15 days) - Same-day scheduling increased the number of new patients - The increase in the provider productivity rate was statistically significant	9

Patient's age, clinic location, and language correspondence between patients and providers can also be effective on the no-show rate. In the two reviewed studies, the no-show rate was reported to be more in younger patients.<sup>12,43</sup> Proximity to the clinic location could be effective on no-show rate.<sup>10</sup> Another study showed that language correspondence between patients and physicians decreases the no-show rate.<sup>40</sup>

DuMontier et al. demonstrated that lead times of 0–3, 4–6, and 28–30 days have the no-show rate of 8, 16, and 22%, respectively. Therefore, it seems that increase in the amount of lead time is associated with the increased no-show rate.<sup>46</sup> This finding was similar to the result of another reviewed study.<sup>25</sup> Furthermore, in another study, it was shown that the lead time was one of the factors associated with the no-show rate.<sup>43</sup> It seems that the successful implementation of OA decreases the no-show rate by reducing the lead time.

Using the reminder in OA reduces the no-show rate. In some selected articles reviewed in this study, it was tried to utilize reminders to reduce the no-show rate; however, the impact of reminders on reducing the no-show rate during the intervention was not evaluated.<sup>39</sup> Furthermore, in another study, the patients were asked about the type of reminders they prefer to receive before their appointment. About 97.2% of patients chose phone call (50.5%) and SMS (short message service) (46.7%).<sup>5</sup>

The reviewed studies demonstrated that the implementation of OA, directly or indirectly, leads to the decreased costs and increased clinics profits. In another article, about 20% increase was observed in clinic monthly visits after the implementation of OA.<sup>39</sup> O'Connor et al. faced to lower no-show rate and more patients visited by physicians after the implementation OA.<sup>40</sup> Additionally, another study<sup>41</sup> showed that the utilization of OA could increase healthcare clinics benefits by converting physicians working hours to an effective time through reducing no-show rate. In addition, another article clearly mentioned that increase in access to care through the implementation of OA reduces operating costs and improves patient satisfaction.<sup>48</sup> In contrast, the cost reduction by using the OA was not reported in other articles.<sup>41,45</sup>

One of the key points for successful implementation of a system is cooperation and participation of all its stakeholders. This issue is applied for the implementation of OA. In a reviewed article, it was stated that if patients believe they are a component of healthcare system and interact with the providers, the no-show rate would reduce.<sup>43</sup> Other articles showed that if physicians fully accept the system, there would be much more improvement in the outcome measures.<sup>37,49</sup> On the other hand, raising stakeholders' awareness about the advantages of using OA through accurate and consistent training would play a key role in improving system performance. Furthermore, the main factor in success of one reviewed study has been reported to be in patients, physicians, and staff education.<sup>39</sup> On the other hand, one of the problems of another study, has been reported to be lack of enough training to providers.<sup>22</sup>

In most studies, the impact of the OA implementation has been evaluated as before-after study design. However, this design is rather weak to investigate the causal relationship and should be used in randomized controlled trials (RCT) or interrupted time-series method.

**TABLE 3** Study setting of the 16 articles.

Reference	Age	Insurance status	Training	Setting
[34]	Not mentioned	Not mentioned	Used video and handout to educate patients	Academic teaching practice
[35]	Not mentioned	Not mentioned	Not mentioned	Six primary care practices (three family medicine practices, two community health centers, and one internal medicine practice)
[36]	Elderly patients	Not mentioned	Not mentioned	The Department of Veterans Affairs Geriatrics Clinic
[37]	Not mentioned	Not mentioned	Implemented a patient education program	Academic practice
[38]	Infant well-child	About two-thirds of the patients have Medicaid, one-third are uninsured	Not mentioned	Community health center pediatric clinic
[40]	Not mentioned	92% of the patients insured by Medicaid and 6% served by the North Carolina State Children's Health Insurance Program	Not mentioned	Not mentioned
[41]	Not mentioned	Low-income and minority individuals, persons with disabilities, the elderly, and persons with multiple chronic diseases	Not mentioned	Not mentioned
[20]	Not mentioned	Not mentioned	Not mentioned	Academic family practice
[43]	Adult	Not mentioned	Developed a handout to educate patients	Federally qualified health center
[23]	Not mentioned	Not mentioned	Not mentioned	University of Virginia Eye Clinic
[44]	1-65+	Medicaid 77%, Medicare 16%, private 4%, self-pay/none 2%	Had patient education	Not mentioned
[45]	Not mentioned	Not mentioned	Not mentioned	Continuity clinic at the University of Florida
[46]	Not mentioned	Insurance status consists of Medicaid, Medicare, uninsured, and underinsured	Not mentioned	The Jefferson County Department of Health, in Alabama, provides primary health care in eight locations throughout the county

Determining the actual needs of patients or providers leads to the successful implementation of OA.<sup>50</sup> DuMontier et al. found that identification of patients and their needs leads to the improvement in results. In this study, for better understanding of patients' needs, the providers conducted an interview before the OA implementation. This attempt leads to the increased recognition of patients and their problems and ultimately reduces the no-show rate.<sup>46</sup>

## 4.2 | Strengths and limitations

This study can provide helpful insights about the use of OA on the no-show rate of patients in outpatient clinics. However, this study also had limitations. The limitation of this study was that despite

the comprehensive search, some related articles might have been lost.

By considering some conditions, it seems that the OA implementation could reduce the no-show rate. These conditions include (1) conducting needs assessment and system design based on the patients' and providers' actual needs, (2) cooperation of all system stakeholders through accurate and consistent training, and (3) Choosing an appropriate strategy of combating no-show based on the demographic characteristics of patients of each clinic. For example, a clinic with older patients is better using alert methods such as Postponing appointment time. On the other hand, for more accurate OA impact assessment, it's better to use RCT design for the omission of confounders. One of the criteria for measuring the quality of studies was to describe the full characteristics of OA.



**TABLE 4** Quality score of the 16 adopted articles.

Quality evaluation criteria	[34]	[35]	[36]	[37]	[38]	[39]	[40]	[41]	[20]	[28]	[42]	[43]	[23]	[44]	[45]	[46]
(1) The study objectives have been clearly stated.	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1
(2) All assessment criteria of scheduling system have been clearly defined.	1	0	0	0	1	0	1	1	0	1	1	1	1	1	1	1
(3) All assessment criteria have been reported quantitatively.	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
(4) Data collection method has been clearly described.	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
(5) The study population has been clearly specified.	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
(6) Intervention has been clearly explained.	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0
(7) Scheduling system features have been expressed in a transparent situation.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
(8) Study design has been clearly explained.	0	1	0	0	1	0	1	0	0	0	1	0	1	0	1	1
(9) Study setting has been clearly marked.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
(10) Study limitation has been fully reported.	1	1	0	0	1	1	1	0	0	1	1	1	1	1	1	1
Total scores	8	8	5	4	9	6	9	7	6	7	8	8	9	8	9	9

This criterion was reported in none of those 16 articles. Therefore, it is better to fully describe the OA characteristics for guidance of other researchers. For further research, we start to conduct detailed research into the reasons for no-show rate and then build solutions for eliminating it. It is suggested that future studies use things such as telemedicine, warnings, and interventions based on mobile health to reduce the number of patients not visiting.<sup>51-58</sup>

## 5 | CONCLUSIONS

No-show rates have been associated with adverse healthcare outcomes and open access scheduling system identified as very effective in reducing it. According to this study results, it seems that the use of OA in most outpatient clinics caused a significant decrease in the no-show rate. By reducing the no-show rate, OA lets patients have access to healthcare services. If this system is managed effectively by developers and patients, it could have desirable performance in the reduction of no-show rate. However, Due to varied results in the no-show rate and related factors, more research is needed.

### AUTHOR CONTRIBUTIONS

**Mohammad Reza Mazaheri Habibi:** Investigation; writing—original draft; data curation; conceptualization; visualization. **Fahimeh Mohammad Abadi:** Investigation; writing—original draft; visualization. **Hamed Tabesh:** Data curation; formal analysis; methodology. **Hasan Vakili-arki:** Data curation; formal analysis; methodology. **Ameen Abu-Hanna:** Data curation; formal analysis; methodology; validation; writing—review and editing. **Kosar Ghaddaripouri:** Investigation; writing—original draft; methodology. **Saeid Eslami:** Supervision; writing—review and editing; validation; methodology; data curation; project administration.

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### CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

### DATA AVAILABILITY STATEMENT

The data sets supporting the conclusions of this article are included within the article and its additional files.

### TRANSPARENCY STATEMENT

The lead author Saeid Eslami affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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