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Advanced Access Scheduling: Impact on Healthcare Delivery and Issues

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Abstract: *Advanced Access Scheduling (AAS) is a healthcare delivery model aimed at reducing patient wait times, reducing no-shows, and improving healthcare delivery. The literature review is focused on the influence the model has on patient satisfaction with treatment, its impacts on health outcomes (either positive or negative), and the obstacles that hinder its implementation with significant literature generating evidence of patients being able to secure the same-day appointments and patient's satisfaction having mixed results. AAS assists in managing healthcare resources effectively, streamlining workflow, and enhancing quality of care. Nonetheless, problems associated with matching demands of patients and clinician supply exist, along with the challenges in continuity of care for chronic disease and resistance by clinicians. Therefore, a strong demand forecasting system must be put in place for accurate patient estimates that align with AAS's continuous process evaluation. Further research is needed to explore studies generating more evidence on the practical application or use of the AAS model across different health facilities and to establish sustainability models leading to effective strategies and interventions.*

Keywords—Advanced Access Scheduling, Open-Access Scheduling, Same-Day Scheduling, Healthcare delivery, Health outcomes, Patient Satisfaction, Implementation Barriers

1. INTRODUCTION

The constant and unwanted delay of care represents the current health systems which are not just caused by the lack of resources but are typically brought by unplanned scheduling and distribution or allocation of resources [1]. Accessibility and availability are the cornerstones and building blocks of an effective primary health care system. However, the current health system faces an issue of access to care which has hindered people in proper utilization of healthcare services. The problem of access to medical care is a concern for everyone including the consumer or patients, the primary care providers, and the policymakers who have been at the top of the decision-making process [1-4]. One of the most important aspects of primary health care is getting care at the appropriate time (timeliness) to ensure that the patient can get the required care whenever they need it and minimize the chance of mortality [1-3, 5]. Reducing wait times and delays for those receiving and giving care is an important indicator of healthcare accessibility [3]. Analysis of primary care data reveals that appointment durations do not reliably reflect treatment timeliness. Several variables impact the intervals between consultations, including the difficulty in getting in touch with physicians and the fact that patients' health might make primary care visits take longer than expected [6].

The average wait time for new patient-physician appointments in 15 metropolitans in the US was 26 days as per the AMN Health Survey (2022) depicting an increase of 8% and 24% since 2017 respectively. The survey recorded data from five different specialties with an increase in wait times in four specialties such as OB/GYN (31.4 days), cardiology (26.6 days), orthopedic surgery (16.9 days), and dermatology (34.5 days). However, there was a decrease in wait time to 20.6 days for family medicine (down 30% from 2017) [7]. The long wait for primary health care appointments can have detrimental effects physically and mentally resulting in serious health issues. For example: Prolonged wait times have been associated with worse health outcomes for patients with serious conditions like cancer, heart disease, and mental health. Patients can't receive timely access to care which increases the risks of morbidity and mortality When there is a deterioration in health status, it will lead to prolonged recovery time increasing healthcare expenses (medical bills), and loss of income (inability to work) [8]. Ultimately, this will have a significant impact on patient satisfaction and bring a change in healthcare utilization patterns. When a patient faces extended delays in securing their appointments in primary care, the shift is seen in urgent care centers which will receive appointments for cases that don't require emergency care. More than one-third of emergency visits were the result of patients not being able to access primary care

promptly [1, 8-9]. In addition, there are serious implications [10] when a patient doesn't show up for their pre-scheduled primary care appointments leading to serious health issues, financial obstructions to the healthcare system, and an increase in healthcare spending. There is a gap in communication between physician and patient leading to weakened patient-physician relationships [10-11]. This also affects other patients who are waiting for their schedule and can't book the appointment slots on time [11]. The use of open access scheduling also known as advanced access scheduling (AAS) or same-day scheduling has proven to be one of the most cost-effective (economical) techniques with a primary focus on reduction of the delays in care and timely access to primary healthcare appointments [1, 8].

Advanced access revolutionaries the traditional method by providing a prioritization of same-day access allowing the preferred physician for treatment [1, 12-13]. With the adoption of advanced access, primary care will have half 50% of slots open each day allowing to accommodate patients who need immediate care through walk-in. The remaining third of the appointment slots are reserved for patients who need clinical follow-up or for patients who missed their appointments on their pre-scheduled day. Overall, advanced access is a flexible model that accounts for continuity of care through the efficient use of clinical resources [1, 12]. Advanced access can be achieved with a few factors including balance in supply (availability of appointments) and demands (appointment requests made), reduction in backlog through minimization of wait times, simplifying appointment types and times for streamlining the process, developing the contingency plans to avoid unforeseen circumstances or emergencies (continuity of care), decreasing the need or demand for superfluous visits and maximize the use of available resources (effective supply) [1, 3, 14-15]. Advanced access is different from traditional methods of appointment scheduling where the patients must wait for several days for routine visits and can book an appointment slot based on the urgency of care (emergency or regular). However, advanced access enables physicians to sort the appointment availability based on the demand for care [1, 12, 15] and opens appointment slots for advanced booking allowing for requests made on the same day [1, 13, 16].

Advanced access improves care for patients by eliminating practice clashes, waste, and postponements, which in turn ensures a balanced clinical practice and avoids unwarranted visits [1, 15]. The effectiveness of advanced access scheduling is dependent on a proper balance between demand and primary care provider capacity and availability. If there is a constant rise in the demand exceeding the required capacity, the advanced access model will not be able to meet the patient's needs in the long term [1]. In addition, there is also a challenge among healthcare providers who still believe that urgent care needs more priority than routine care. Clinics will find it difficult to get accustomed to the advanced access model which treats urgent and routine care appointments as similar entities [1, 15]. It is important to gather data with care to calculate the proportion of advanced access scheduling slots as opposed to same-day appointments. Data items that should be analyzed include the volume of patients, canceling fees, rates of people not attending appointments, payer mix, and scheduling trends, such as the percentage of same-day appointment requests [17].

2. METHODOLOGY

The review aimed to focus on the existing evidence on the impact of Advanced Access Scheduling (AAS) on healthcare delivery (either positive, negative, or no effect), level of patient satisfaction, healthcare utilization, and outcomes, and the associated difficulties in implementing the AAS method. The literature review focused on foundational knowledge of AAS, and the interventions required for proper implementation. The approach utilized for the literature review explored studies on AAS to identify the effectiveness of AAS and the areas for improvement which will help in identifying research gaps. The peer review focused on mainly three aspects:

- What are the effects of AAS on patient wait times and appointment availability?
- When it comes to healthcare outcomes and patient satisfaction, what are the impacts of AAS?
- What are the issues in the implementation of AAS?

The peer review utilized various databases to search for articles on AAS. Databases were identified through Google Scholar (used for data and reports published by the government and other organizations). The data search was conducted in multiple databases including PubMed, Cochrane Library, and Scopus. A combination of keywords and terms was used for the search of articles, and this included terms like "Advanced Access Scheduling," "Same-Day Appointments," "Healthcare Delivery," "Patient Satisfaction," "Healthcare Outcomes," "Implementation Challenges," and "Delay of Care".

Inclusion Criteria:

The inclusion criteria included studies evaluating the impact of AAS interventions on healthcare delivery, reporting on patient satisfaction and outcomes, identifying challenges and barriers in implementing AAS, and peer-reviewed articles including randomized controlled trials (RCTs), cohort studies, case-control studies, and systematic reviews.

Exclusion Criteria:

The exclusion criteria included articles without relevant outcomes and studies published in languages other than English.

3. Results

Article	Type of Study	Model Used	Results
Bennett & Baxley, (2009) [18]	Survey	AAS	More patients from minority groups, those on Medicaid, those who paid out of pocket, and younger patients were found to have skipped appointments altogether, accounting for 20.5% of all visits. On Mondays, there was a larger rate of no-shows compared to subsequent days. There was a wide range in the no-show percentage from June 2005 (17.6%) to November 2005 (23.7%). Appointment no-shows were most often predicted by factors such as wait duration, frequency of appointments, provider type, patient racial background, and principal payment technique, as well as by scheduling with the patient's primary care physician.
Breton et al., (2023) [5]	Cross-sectional	AAS	Four of the five principles for AA methods had different rates of acceptance across different types of providers. There is a notable disparity in the adoption of AA methods between family doctors and nurses, with nurse practitioners occasionally showing better alignment with family physicians. There are further distinctions between family doctors and nurse practitioners in the appointment system review concept, which pertains to things like changing the length of consultations and appointment weeks.
Cameron et al., (2010) [19]	Descriptive	AAS	There was a successful reduction in appointment wait times with the implementation of advanced access and, also, a lowering in the rate of missed appointments (3.33% to 1.89%). The time taken for a patient to secure an appointment when booking the third available slot was reduced from 13.7 days to 3.6 days. The findings suggested that patients could access the appointments early enhancing patient utilization of healthcare services. However, there was no notable rise in patient volume during the time frame of the study (9 months).

Decreased wait time	Decreased no-show rate
Yes	Yes

<table>
<tr><td>Chen et al., (2024) [20]</td><td>Descriptive</td><td>AAS</td><td>Several significant improvements were seen with the implementation of advanced access with a notable increment in the volume or frequency of patients seen by healthcare providers within 5 days of being referred (from 22% to 61%). The P value (< 0.00) indicates the increase was statistically significant and highly effective in reducing wait times. The implementation of advanced access greatly reduced the median time it took for patients to be seen after a referral. The median time dropped from 12 to 3 days and was also statistically significant (P< 0.001). The implementation also reduced the rates of patients who didn’t show up for their appointments from 15% to 7% and was also statistically significant (P< 0.001).
<table>
<tr><td>Decreased wait time</td><td>Decreased no-shows</td><td>Improved quality of care</td></tr>
<tr><td>Yes</td><td>Yes</td><td>Yes</td></tr>
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<tr><td>Heale & Fournier, (2017) [21]</td><td>Survey</td><td>AAS</td><td>The survey findings revealed that only 14.5 of the patients couldn’t secure same-day appointments while most of the patients (85.4%) were able to access same-day appointments indicating timely access to healthcare. The data also showed that 24.7 of the patients were able to get access to medical care without prior scheduled appointments through walk-in clinics and 19.8% reported attending emergency departments. The data on patient satisfaction with the use of advanced, less reliance on walk-in clinics and emergency visit access was statistically significant (p=0.001) signifying a higher level of satisfaction among patients who adapted to advanced access.
<table>
<tr><td>Decreased wait time</td><td>Patient Satisfaction</td></tr>
<tr><td>Yes</td><td>Yes</td></tr>
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<tr><td>Krippel et al. (2020) [10]</td><td>Non-experimental quantitative, correlational</td><td>AAS</td><td>When a patient can get the required care from their preferred physician, they are more likely to visit the physician and not miss the scheduled appointment. However, there is a high chance that a patient will miss an appointment with a non-preferred physician (53.4%) in comparison to the preferred physician (46.6%). The findings from the study revealed that missed appointments can be reduced if the advanced scheduling model allows visits with the preferred physicians rather than the non-preferred primary care physicians. In addition to strengthening the patient-physician relationship, advanced access led to timely care, and easy access to primary providers on the same day or shortly after reducing the financial burden of emergency visits. The implementation of advanced access or same-day model showed a notable difference in show</td></tr>
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<tr><td></td><td></td><td></td><td>rate (more effective) in comparison to the average national no-show rate.
<table>
<tr><td>Decreased wait time</td><td>Decreased no-shows</td><td>Improved quality of care</td></tr>
<tr><td>Yes</td><td>Yes</td><td>Yes</td></tr>
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<tr><td>Mehrotra et al., (2008) [22]</td><td>Case series</td><td>AAS</td><td>The implementation of advanced access had an initial improvement in wait times with a significant reduction in mean wait times for the third available slots. The wait time decreased to 8 days from 21 days while the long visits decreased to 14 days from 39 days with both values of P being statistically significant (<0.001). However, there were challenges in achieving same-day access over two years, and the wait time for the third available appointment also increased. This suggests that sustaining these practices over a long period is challenging. In addition, there were no significant changes in the no-show rate (remained constant during pre- and post-intervention-14 %) and proportion of patient rating availability of the appointment (48% in pre-intervention and 51% during post-intervention).
<table>
<tr><td>Decreased wait times</td><td>Decreased no show</td></tr>
<tr><td>Yes(initially), however, it increased over a long period</td><td>No change</td></tr>
</table></td></tr>
<tr><td>Pare et al., (2021) [4]</td><td>Survey</td><td>Mixed</td><td>The effectiveness of advanced access scheduling is directly or indirectly related to its principles. The study highlighted the adoption and implementation of advanced access principles across sample clinics and showed that there was a low adoption rate for advanced access. Either the clinics didn’t implement AAS (more than half) or had only implemented one or two core principles of AAS. This signified that a large proportion of clinics didn’t understand the benefit of AAS impacting clinic operations and patient access to care while implementing advanced access.</td></tr>
<tr><td>Robinson & Chen, (2009) [23]</td><td>Comparative</td><td>Traditional & AAS</td><td>The performance for same-day or advanced access scheduling is comparatively higher than the traditional scheduling model, particularly in performance regarding significant no-show probabilities and larger workloads. When a patient’s wait time (a component of the system’s efficiency) is above the 0.003 threshold, the effectiveness of advanced access increases. The physician's transition from open access or advanced access allowed them to expand their panel size by 30% as it minimizes the downtime allowing physicians to see a greater number of patients.
<table>
<tr><td>Decreased no-shows</td></tr>
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			Yes
Rivas (2020) [16]	Peer review	AAS and traditional	The study found that advanced access can significantly reduce the time patients have to wait to schedule appointments. An 83% reduction indicates that the average wait time would be 1.7 days with AAS if we consider the average wait time of 10 days. Similarly, appointment scheduling reduced the no-show rates by 67% indicating that it led to fewer wastage in appointment slots. In addition, advanced access can increase the number of patients by 50% enabling efficient management of appointments and, leading to decreased visits for emergency and urgent care by 75% suggesting timely access to care.
Sivanesan et al., (2017) [24]	Retrospective Observational	AAS	The study found a decrease in the mean cancelation rate from 35.7% to an additional 4.2%. The data was statistically significant with a confidence interval (CI) ranging from 1.4 % to 6.9% and a P value being 0.005. The wait time for new patient appointments or lag time also decreased by 4.7 days on average. There is a significant reduction as depicted by CI (23 to 7 days) and a P value (<0.000) indicating a high level of statistical significance. Ultimately, the monthly average count of new patient visits increased to 225.0 from 158.5 with a P-value (=0.0004) being statistically significant.
			Reduced appointment time lags: Yes; Decreased no-show rate: Yes
Sperl-Hillen et al., (2008) [25]	Descriptive	AAS	The implementation of advanced access saw a decrease in appointment wait times to 4.2 days from 21.6 days and a P value of less than 0.01. The study also found a 6.5% improvement in the continuity of care with the data being statistically significant (P< 0.01) signifying that patients were able to get access to consistent healthcare. The clinical outcome also showed an increase in percentage achieving the recommended guidelines such as HbA1c, 7%, and low-density lipoprotein (LDL) < 100 mg/dL. The increment rate for hemoglobin A1c (HbA1c) and LDL was 52.3% from 44.4% and 38.7% from 29.8% respectively. One interesting part of the study is that the study didn't find a direct correlation between the reduction of wait times and improved quality of care for diabetes.
			Decreased wait time: Yes; Continuity of care: Yes
		AAS	Those in outpatient clinics had a much higher systolic blood pressure (6.4 mmHg, p <0.05) and a lower average

<table>
<tr><td>Subramanian et al., (2009) [26]</td><td>Retrospective Cohort</td><td></td><td>hemoglobin (A1c) at the 1-year follow-up compared to those in control clinics. Nevertheless, the variations in clinical significance were minimal. Open Access or advanced access significantly affected systolic blood pressure (SBP) and other intermediate outcomes of diabetic management but had no immediate effect on emergency department visits or hospitalizations.

Results: The study didn't significantly change health care utilization patterns suggesting that other metrics of patient care should be considered along with scheduling appointments.</td></tr>
<tr><td>Tuli et al., (2010) [27]</td><td>Quasi-experimental</td><td>AAS</td><td>The study revealed that the Advanced Access (AA) template was more effective than the Prior Template (PT). The patient volume and flow increased among residents who used the AA template and saw a rise in patients per session ($p < 0.05$). There was a substantial improvement (120%) in the frequency of new or reassigned patients among residents who adopted the AA template signifying better AA accommodation or integration capacity. With the implementation of the AA template, well-child visits decreased by slightly more than 2/3rd (70%) of the previous visits, supported by an odds ratio of 0.3 signifying that the AA template increased uninterrupted care (continuous care) and efficient patient management. Within the study timeframe, patient satisfaction notably increased in the capability to book a routine appointment and wait times in the clinic which was evident by the statistical significance ($P<0.05$).

Patient Satisfaction: Yes
Decreased wait time: Yes</td></tr>
<tr><td>Vidal et al., (2019) [28]</td><td>Cross-sectional</td><td>Different including AAS</td><td>Out of 11 health centers, only two health centers adopted advanced access while 63.64% of health centers didn't have a good general primary health care (PHC) score. The best possible or optimal general PHC score was reported in health centers that favored advanced access as the scheduling model (7.04). A comparative analysis of traditional, carve-out-model, and advanced access depicted that the mean difference was 0 meaning there is an association between advanced access and primary health care scores.

Patient Satisfaction: Yes
Improved quality of care: Yes</td></tr>
</table>

The various findings on AAS, including its impact on healthcare delivery, depicted the benefits, challenges, and outcomes of implementing advanced access scheduling. Of all the articles, five articles highlighted the significant reduction in wait times for appointments [19-20, 22, 24-25] signifying that advanced access brings substantial improvements in scheduling efficiency. Similarly, four studies identified decreased no-show rates [10, 20, 23-24] leading to an effective and patient-friendly healthcare system. In addition, there was significant patient satisfaction [21, 27, 28] and improved quality of care [10, 20, 25, 28] with the implementation of advanced access scheduling.

4. DISCUSSION

Advanced access transitions the nature of care and doesn't distinguish between urgent and regular appointments which removes the backlog of patients and ensures that each day's work is completed by keeping subsequent days open [1, 15]. Advanced access scheduling is closely tied to its principles and the intended failure in outcome is due to inconsistent and low adoption rates in primary healthcare [4,5] and varied understanding of AAS principles [4]. Advanced access showed a reduction in wait time and no-show rates respectively as per studies generated in the result section. The results are further supported by two more studies showing a reduction in wait time from 21 days to between 4 & 7 days (statistically significant) and from 36 days to 4 days respectively. Similarly, the no-show percentage declined from 9.23% to 6.67% and 5% respectively [29-30]. However, one of the studies reporting the increase in wait time in a year signified that the sustainability of advanced access is a concern that is related to challenges like decreased appointment supply (physicians either leaving or being absent) and rise in appointment demands for new patients after the initial implementation of advanced access [22]. Similarly, advanced access didn't have much impact on those healthcare practices that already had good records of patients showing up for their appointments [13]. The findings showed mixed results for patient satisfaction, with two studies showing that patients had an increased satisfaction level with the implementation of AAS [30-31] and one study showing increased t-test mean and statistically significant for a change in satisfaction ($P < 0.05$) [31]. However, two other studies highlighted that the difference in patient satisfaction levels wasn't significant after the implementation of AAS [30, 32]. Advanced access could be a quick method of gaining access to appointment availability, however, many patients were concerned with the flexibility of the appointment rather than the speed of the appointment leading to the conclusion that AAS needed to tailor the availability and accessibility of appointments based on needs of the patients [32]. In addition, AAS has been one of the models that have been a significant contributor to improving the quality of care [10-11, 20, 25, 28]. However, Subramanian et al. (2009) identified that AAS had minimum clinical significance in diabetic management. Although there was a decrease of 35 and a 5% decrease in emergency department visits and hospitalization, the healthcare utilization matrix didn't have any significant relation [26]. When patients who had conditions like diabetes, chronic heart disease, or depression utilized advanced access, it didn't significantly impact the use of primary healthcare. Patients with these conditions continued to see their doctors regularly and the rate of hospitalizations didn't increase, signifying that AAS enhanced the process of scheduling appointments [33]. AAS should be tailored to maximize patient benefits by addressing their needs and designing a proper method to tackle its implementation barrier.

5. IMPLEMENTATION CHALLENGE

There is a concern that patients with chronic diseases who have not received follow-ups due to the adoption of enhanced access will have even less continuity of care [13]. The implementation is especially challenging with a need to ensure that there is an appropriate balance between demand and supply. The demand for the appointment is hard to predict and if the demand exceeds the supply, AAS is bound to fail [13, 34, 35]. Primary healthcare practices should consider balancing the roster size or minimizing the roster size [35, 36], increasing the number of working days, and ensuring that nonphysician employees are also involved [35]. There is also a certain role in the volume of patients seen by the physician as the large panel size for a physician is characterized by lower quality of care and disease prevention & management [28]. The mismatch of demand and

supply for advanced access is also closely related to human resources (doctors & nurse shortage) [37, 38]. One of the major things that needs to be considered is the number of cancellation rates and requests for advanced access [17]. One of the studies that had a successful implementation of advanced access suggested a need for recall lists or follow-up lists and a reminder system which would enhance resource use and timely care improving operational efficiency [37]. The advanced access principles focus on reducing the backlog, however, one study found it hard to clear the backlog of appointments. This is particularly difficult for bigger healthcare facilities to observe the reduction of delays as a benefit in comparison to a physician [1]. The concept of advanced access doesn't differentiate between routine and urgent care, however, there is resistance to change among physicians with this differentiation as it forces them to abandon the notion of waiting for regular visits [1, 15, 37]. The other issue is the patient who is accustomed to a cultural setting of a traditional scheduling system. There is a need for patient education which involves calls, reminders, and face-to-face consultation through a channel prioritizing the advanced access scheduling model [37].

6. CONCLUSION

The utilization of advanced access in healthcare is assessed by several key indicators, including demand, capacity, volume of patients, availability of the next appointment, projected available capacity in the future, and seamless provision of care [1]. Advanced access has proven to be a flexible model for the practice of primary care and can enhance improved utilization of primary healthcare services through a better patient experience [36]. However, the AAS model also needs to consider the patient demographics, their needs, and the environment for clinical practice [16]. The sustainability of AAS can lead to better patient outcomes, and this can be done through a centralized scheduling process and consistently following the established protocols for appointment and scheduling activities [17]. In order to fully grasp the AAS model in primary care, there is a need for further research and studies [10, 16-17] focusing on retrospective, cross-sectional, and observational methods along with randomized controlled trials to generate an evidence-based recommendation [16]. In addition, future researchers should also prioritize several factors like the purpose of the visit, frequency of missed appointments, service level (acute or chronic) [10], late arrivals, doctor delays, and variable appointment lengths [23]. One of the most intriguing facts about advanced access is that the USA first implemented it, however, the current studies have mostly been focused on the country settings UK and Canada. This means there is a gap and a question as to why much research hasn't been focused on advanced access scheduling in country like the USA. One reason could be that the United States healthcare market is dominant and led by private healthcare while the United Kingdom (UK) and Canada have nationalized healthcare controlled by the government. There is a need for both qualitative and quantitative data that can generate sufficient evidence on the AAS model and this can only be possible when healthcare administrators refine the policies on appointment scheduling and practices focusing on reducing wait times, no-show rates, and increasing quality of care [10].

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