ONLINE FIRST | HEALTH CARE REFORM

Advanced Access Scheduling Outcomes

A Systematic Review

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Background: Advanced ("open") access scheduling, which promotes patient-driven scheduling in lieu of prearranged appointments, has been proposed as a more patient-centered appointment method and has been widely adopted throughout the United Kingdom, within the US Veterans Health Administration, and among US private practices.

Objective: To describe patient and physician and/or practice outcomes resulting from implementation of advanced access scheduling in the primary care setting.

Data Sources: Comprehensive search of electronic databases (MEDLINE, Scopus, Web of Science) through August, 2010, supplemented by reference lists and gray literature.

Study Selection: Studies were assessed in duplicate, and reviewers were blinded to author, journal, and date of publication. Controlled and uncontrolled English-language studies of advanced access implementation in primary care were eligible if they specified methods and reported outcomes data.

Data Extraction: Two reviewers collaboratively assessed risk for bias by using the Cochrane Effective Practice and Organisation of Care Group Risk of Bias criteria. Data were independently extracted in duplicate.

Data Synthesis: Twenty-eight articles describing 24 studies met eligibility criteria. All studies had at least 1 source of potential bias. All 8 studies evaluating time to third-next-available appointment showed reductions (range of decrease, 1.1-32 days), but only 2 achieved a third-next-available appointment in less than 48 hours (25%). No-show rates improved only in practices with baseline no-show rates higher than 15%. Effects on patient satisfaction were variable. Limited data addressed clinical outcomes and loss to follow-up.

Conclusions: Studies of advanced access support benefits to wait time and no-show rate. However, effects on patient satisfaction were mixed, and data about clinical outcomes and loss to follow-up were lacking.

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ADVANCED ACCESS IS AN APpointment scheduling system that allows patients to seek and receive health care from their provider at the time of their choosing.[1] Traditional scheduling systems arrange appointments for future dates, resulting in each

See Invited Commentary at end of article

physician's patient care time being mostly scheduled well in advance. Consequently, wait time for appointments can be long, and patients may miss long-scheduled appointments.[2] In fact, the average wait time in 2009 for a new nonurgent visit with a US family practice physician was 20 days.[3] By contrast, in advanced access, patients are offered an appointment on the day that they call or at the time of their choosing, preferably within 24 hours. This results in few prescheduled appointments and a relatively open schedule. Triage is minimized because everyone is offered an appointment whether for urgent or routine care.

There has been increased interest in advanced access as waiting times for routine health care have lengthened in recent years[3,4] leading to negative health outcomes[5] and contributing to emergency department crowding.[6,7] The Institute for Healthcare Improvement[8] reports working with about 3000 practices to implement advanced access. Both the US Veterans Affairs (VA) system and the United Kingdom National Health Service have implemented advanced access in their extensive networks of ambulatory practices.[9,10] In 2003, 47% of National Association of Public Hospitals members reported at least piloting advanced access in their primary care clinics.[11]

Proponents of advanced access suggest that it reduces patient waiting times, improves continuity of care, and reduces no-show rates.[12-14] On the other hand, skeptics of the system point out that advanced access is difficult to implement, may instead reduce continuity of care, and may leave patients with chronic conditions lost to follow-up.[11,12,15,16] Published reports of advanced access implementations are inconsistent. Therefore, given the widespread usage and promotion of advanced access and the uncertainty of its impact on physicians and patients, our objective was to summarize and evaluate the field of research examining the outcomes of advanced access scheduling systems in the primary care setting through a systematic review of the literature.

METHODS

DATA SOURCES AND SEARCHES

To identify relevant articles, we searched the following databases: OVID (1950 through August 2010), Scopus (1960 through August 2010), and Web of Science (1900 through August 2010). Search strategies differed, depending on the database. In OVID, we used the keywords "open access or advanc$ access or same-day" combined with the keywords "schedul$ or appoint$." We also used the keywords "open access or advanc$ access or same-day" combined with the Medical Subject Heading (MeSH) terms "Primary Health Care" and "Appointments and Schedules" using the Boolean term "and." In Scopus we altered the search terms to comply with search mechanisms and used (schedul* OR appoint*) AND ("open access" OR "advanced access" OR "advance access" OR "same day"). We used the search strategy TS=(schedul* OR appoint*) AND TS=(advanced access OR advance access OR open access) to identify articles in Web of Science. We also hand searched bibliographies of pertinent articles.

STUDY SELECTION

Full-length articles, research letters, and brief reports in English were eligible for inclusion. Of these, we included articles that (1) investigated an advanced access intervention in a primary care setting (including cohort, case-control, cross-sectional, and randomized controlled trials), (2) reported quantitative outcomes for patients and/or providers, and (3) compared intervention and nonintervention data. We excluded conference abstracts because of the preliminary nature of their data. Commentaries, editorials, and narratives not written in scientific format—ie, without a full description of methodology, study population, baseline data, or results, and with no statistical testing—were also excluded.

One investigator selected articles for review based on title and/or abstract. Two investigators then independently assessed abstracts for inclusion. Reviewers were blinded to author, journal, and date of publication. If an investigator could not make an inclusion decision based on the abstract, the full article was retrieved. Disagreements were resolved by consensus.

DATA EXTRACTION AND QUALITY ASSESSMENT

Two investigators independently extracted data for each study using a standardized form. Main outcomes included success of advanced access implementation (time to the third-next-available appointment), physician and/or practice outcomes (no-show rate, fiscal outcomes, and provider satisfaction), and patient outcomes (patient satisfaction, continuity of care, loss to follow-up, emergency department and/or urgent care use, and chronic disease quality measures). Time to third-next-available appointment is a widely used metric for appointment availability.[17] It is preferred over the time to the next available appointment because it does not give the false impression of schedule availability if there is a last-minute cancellation. When time to third-next-available appointment data were reported for both new (long) and return (short) visits, we recorded the result for the return visit. We defined continuity of care as any measure of the frequency with which patients saw their own primary care physician.[18-21]

Studies used a variety of questions and reporting methods to describe patient satisfaction. For purposes of analysis, we divided satisfaction questions into 2 broad categories: overall satisfaction and appointment system satisfaction. Overall satisfaction included questions such as "How satisfied are you with today's visit?" Appointment system satisfaction included questions such as "Were you able to get an appointment as soon as you wanted?" or "How satisfied were you with the appointment system?"

In addition, we abstracted study characteristics and demographics including trial design, funding, country of study, practice setting, number of practices and physicians, number of patients, and length of follow-up.

There are no validated tools for assessing the quality of quality-improvement studies, which differ from standard therapeutic intervention studies in several important ways, including unit of analysis (typically provider rather than patient) and role of local context. Consequently, we adapted the Cochrane Effective Practice and Organisation of Care Group[22] risk of bias criteria to qualitatively report the risk of bias of the study results. These criteria are similar to those found in the Standards for Quality Improvement Reporting Excellence[23] guidelines for quality improvement reporting and the Agency for Healthcare Research and Quality Evidence Report on Systems to Rate the Strength of Scientific Evidence.[24] We did not consider funding because no studies were commercially funded.

DATA SYNTHESIS AND ANALYSIS

The limited reporting of the trials and wide variety of outcomes evaluated precluded a meta-analysis of results; consequently, we describe results qualitatively. All study designs are reported together. We hypothesized that if advanced access were an effective strategy, then studies with more successful implementations (defined as those with shorter final time to third-next-available appointment) would be more likely to report successful physician or patient outcomes. The only outcome for which there were enough studies to examine this hypothesis was no-show rate. Consequently, to determine if the success of advanced access implementation affected outcomes, we conducted a linear regression of time to third-next-available appointment on no-show rate.

We used an Access 2002 database (Microsoft, Redmond, Washington) to conduct blinded, independent reviews of the literature, and SAS software, version 9.2 (SAS Institute, Cary, North Carolina) to conduct the linear regression. Because this study did not consist of direct human subjects research, institutional review board approval was not required.

RESULTS

The initial electronic database search identified 2691 citations, of which

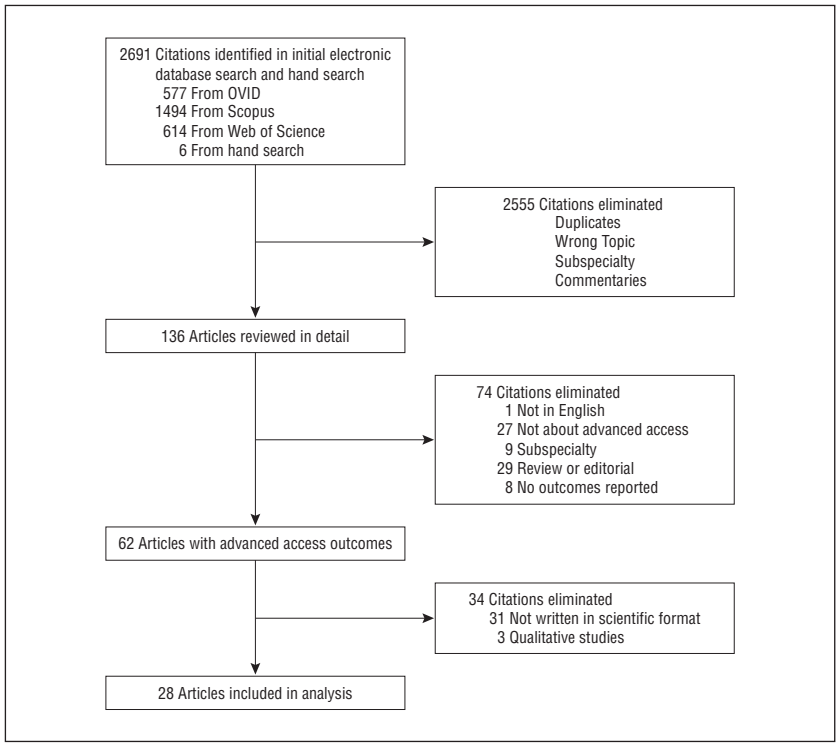

Figure. Flow diagram of search results.

2556 were excluded based on title review by 1 investigator (K.D.R.) because they were not about advanced access, were set in specialty settings, were conference abstracts, or were duplicates found in multiple databases (**Figure**). Two independent, blinded investigators reviewed the remaining 136 article titles and abstracts for selection and excluded 74 because they were not in English (n=1), not about advanced access (n=27), were subspecialty studies (n=9), were reviews, editorials, or nonresearch letters (n=29), or did not include patient or provider outcomes related to advanced access (n=8). Of the remaining 62 articles of advanced access implementations in the primary care setting that reported outcomes, 34 more were excluded because they were narratives not written in scientific format (n=31) or were qualitative studies (n=3). The resulting 28 articles are included in this systematic review. Since several interventions resulted in more than 1 published article, these 28 articles represented 24 distinct studies.

Characteristics of the studies are listed in **Table 1**. Only 1 was a randomized trial. Most took place in the United States in adult medicine practices, and settings ranged from small private offices to large health systems. Follow-up ranged from 3 months to approximately 4 years.

The overall risk of bias in the studies was high (eTable 1 and eTable 2, available at http://www.archinternmed.com). Only 1 study randomized physician participants, and this study was subject to substantial contamination and crossover bias. The remaining studies all included self-selected intervention groups in which baseline characteristics often differed between intervention and control groups. Furthermore, at least 6 studies implemented other practice initiatives concurrently with advanced access. Fewer than half of studies reported basic measures of advanced access implementation such as time to third-next-available appointment. An overview of the results for each outcome is given in **Table 2**.

WAIT TIME FOR AN APPOINTMENT

Eleven articles describing 8 studies reported time to third-next-available appointment, the preferred metric for appointment availability (**Table 3**).[25-29,35,38,40,43-45] Advanced access implementation was associated with a decrease in time to third-next-available appointment in all studies (range, 1-32 days), and the decrease was statistically significant in all 5 studies (6 articles) in which statistical analysis was performed.[25,26,29,35,43,44] Five of 8 studies achieved a mean time to third-next-available appointment of less than 5 days (63%); 2 reached less than 2 days (25%).[29,35] One additional study of community health centers with advanced access scheduling found that 49% of visits were to providers whose individual average time to third-next-available appointment was 4 days or less in the previous year.[41] Two multisite studies found that a greater degree of advanced access implementation was significantly associated with reductions in wait time, although the effect was small.[29,46] For example, in the VA system, the degree of advanced access implementation accounted for 7% of the variance in wait time.[46]

Four additional studies examined time to next appointment only[31,39,47,50]; 2 of these achieved an average next available appointment time of 2 days or less.[31,47] The VA system as a whole, using data from over 6 million patient visits, reported an improvement in next-appointment availability from 42.9 days to 15.7 days.[39]

PHYSICIAN AND PRACTICE OUTCOMES

Besides wait time, the only practice outcome frequently studied was no-show rate, which was reported in 11 studies (**Table 4**). The change in no-show rate ranged from –24% to 0% and was significantly decreased in 5 studies.[27,41,49-51] Of note, 3 of these 5 studies served a population of patients with low socioeconomic status, and all 5 had relatively high baseline no-show rates (16%-43%).[27,41,50]

Seven studies reported the impact of advanced access on visit volume, physician compensation, or productivity outcomes. All reported neutral to positive results (Table 4).

PATIENT SATISFACTION

Four studies reported quantitative data pertaining to overall patient sat-

Table 1. Overview of Included Studies

Source	Provider Specialty	Trial Design	Country of Study	Sponsorship	Provider Setting	Practices, No.	Providers, No.	Follow-up
Belardi et al[25] 2004	Family practice	Controlled before-after	USA	National government	Teaching practice	1 (2 teams)	6 (1.3 FTE) per team	15 mo
Bennett and Baxley[26] 2009[a]	Family practice	Uncontrolled before-after	USA	Not disclosed	Teaching practice	1	49	14 mo
Bundy et al[27] 2005[b]	Family practice	Uncontrolled before-after	USA	Nonprofit	Various (1 not-for-profit practice, 1 private practice, 2 practices owned by large health system)	4	30	9 mo
Dixon et al[28] 2006[c]; Pickin et al[29] 2004[c]	Family practice	Uncontrolled before-after	UK	National government	National Health Service practices	462	NR	8-16 mo
Kennedy and Hsu[30] 2003	Family practice	Uncontrolled before-after	USA	Not disclosed	Teaching practice	1	12.8 FTE (including non-MDs)	5 mo
Meyers[31] 2003	Family practice	Uncontrolled before-after	USA	National government	US military	1	9	4 mo
Phan and Brown[32] 2009	Family practice	Uncontrolled before-after	USA	Not disclosed	Teaching practice	1	32	1 y
Rohrer et al[33] 2007	Family practice	Cross-sectional	USA	Not disclosed	Network of community practices	4 (2 AA, 2 control)	NR	1 y
Salisbury et al[34] 2007; Salisbury et al[35] 2007; Sampson et al[36] 2008; Pickin et al[37] 2010	Family practice	Controlled before-after	UK	National government	National Health Service practices	48 (24 AA, 24 control)	mean 3.26 FTE per practice	1 y
Mehrotra et al[38] 2008	Family practice and general medicine	Uncontrolled before-after	USA	Nonprofit	Health system with small offices	6 (5 in analysis)	2.8-8.8 FTE per practice	1-3 y
Armstrong et al[39] 2005	General medicine	Uncontrolled before-after	USA	National government	Veterans Affairs	862	NR	4 y
Boushon et al[40] 2006	General medicine	Uncontrolled before-after	USA	Nonprofit	NR	17	NR	1 y
Lasser et al[41] 2005	General medicine	Cross-sectional	USA	National government	Network of neighborhood health centers	16	58	NR
Lewandowski et al[42] 2006; Solberg et al[43] 2004; Solberg et al[44] 2006; Sperl-Hillen et al[45] 2008	General medicine	Uncontrolled before-after	USA	Nonprofit	Multispecialty medical group	17	500 all specialties; 105 (99.6 FTE) primary care	1-2 y
Lukas et al[46] 2004	General medicine	Cross-sectional	USA	National government	Veterans Affairs	78	NR	NR
Radel et al[47] 2001[c]	General medicine	Uncontrolled before-after	USA	Not disclosed	Health maintenance organization	2	6	1 y
Subramanian et al[48] 2009	General medicine	Controlled before-after	USA	National government	Teaching practice	12	~ 100	1 y
Cherniack et al[49] 2007	Geriatrics	Uncontrolled before-after	USA	Not disclosed	Veterans Affairs	1	8	1 y
Mallard et al[50] 2004	Pediatrics	Uncontrolled before-after	USA	Local government	Community health center	1	2	6 mo
O'Connor et al[51] 2006	Pediatrics	Randomized controlled trial	USA	National government	Community health center	1	10	4 mo
Parente et al[52] 2005	Pediatrics	Uncontrolled before-after	USA	Not disclosed	Teaching practice	1	4	3 mo

Abbreviations: AA, advanced access appointment scheduling; FTE, full-time equivalent; NR, not reported; UK, United Kingdom; USA, United States of America.
[a] Institute for Healthcare Improvement Access and Efficiency Collaborative study.
[b] "Institute for Healthcare Improvement QI Initiative," May 2001 to May 2002.
[c] Idealized Design of Clinical Office Practices study.

isfaction (**Table 5**). Of these, 1 reported statistically significant improvement.[27] Quantitative before and after data on satisfaction with the appointment system were reported in 4 studies (Table 5).[27,34,36,38,46] None showed significant improvement. In 1, each 10% increase in proportion of same-day appointments was associated with an 8% *reduction* in satisfaction (odds ratio, 0.92 95% confidence interval, 0.90-0.94).[36]

Table 2. Selected Major Outcomes Following Advanced Access Implementation, Summary of Studies

Outcome	Studies, No.	Overall Result	Result Among Studies With Concurrent Control Group
Time to third-next-available appointment	8	Statistically significant improvement in 5; any improvement in all 8; only 2 achieved access within 48 h	(n=2); significant improvement in both, one achieved access within 48 h
No-show rate	11	Statistically significant improvement in 5; more than 2% absolute improvement in 6; any improvement in 10	(n=4); significant improvement in 2, nonsignificant change in 2
Patient satisfaction (overall)	4	Statistically significant improvement in 1; any improvement in 2	(n=0)
Patient satisfaction (appointments)	4	Statistically significant improvement in 0; any improvement in 2; statistically significant worsening in 1	(n=2); nonsignificant change in both
Continuity of care	9	Statistically significant improvement in 3; any improvement in 7; worsening in 2 (none statistically significant)	(n=3); 1 significant improvement, 2 nonsignificant change
Health care utilization	2	No significant change in ED visits or hospitalizations; 1 study reduced visits to urgent care	(n=1); no significant change

Abbreviation: ED, emergency department.

Table 3. Time to Third-Next-Available Appointment

Source	TTTA, d			*P* Value
	Without AA	With AA	Change (95% CI)	
Belardi et al[25] 2004	21	4 to 7	−14 to −17	<.01
Pickin et al[29] 2004[a]	3.6	1.9	−1.7 (−1.4 to −2.0)	<.05
Bundy et al[27] 2005	36	4	−32 (−20 to −44)	NR
Salisbury et al[35] 2007	2.9	1.6	−1.1 (−2.2 to −0.1)	.04
Bennet and Baxley[26] 2009	30.7	9.0	−21.7	<.001
Solberg et al[43] 2004[b]	Overall 17.8	4.2	−13.6	NR
Solberg et al[44] 2006[b]	Dep 19.5	4.5	−15	<.01
Sperl-Hillen et al[45] 2008[b]	DM 21.6	4.2	−14.7	<.001
Mehrotra et al[38] 2008	21	11	−10	NR
Boushon et al[40] 2006	23	10	−13	NR

Abbreviations: AA, advanced access; CI, confidence interval; Dep, depression; DM, diabetes mellitus; NR, not reported; TTTA, time to third-next-available appointment.
[a] Similar results reported in Dixon et al[28] (2006) from the same data set.
[b] These articles report data from the same study.

However, a VA survey found that patient satisfaction appeared to be higher at facilities with shorter wait times (*P*=.09).[46]

CONTINUITY OF CARE AND LOSS TO FOLLOW-UP

The effect of advanced access scheduling on continuity of care was explored in 9 studies using multiple methods of assessing continuity (**Table 6**). Only 2 studies found significant decreases in continuity.[32,51] Of these, 1 noted that a provider in the advanced access group was on maternity leave during the brief 4-month period of study follow-up, potentially accounting for this finding.[51]

Loss to follow-up was rarely evaluated, and results were mixed. Two studies found no consistent difference in loss to follow-up between advanced access and traditional scheduling.[25,33] One study of patients with depression found more patients had primary care follow-up after advanced access implementation (33.0% vs 15.4%) (*P*=.001) but also noted that fewer followed up after a mental health hospitalization (50.3% vs 65.9%) (*P*=.001).[44] An advanced access VA practice found that 19% of geriatric patients failed to arrange follow-up appointments; however, this study did not report loss to follow-up prior to advanced access implementation.[49]

CLINICAL OUTCOMES

Emergency department, urgent care, and/or hospitalization rates under advanced access were quantitatively reviewed in 4 articles about 2 studies (Table 6).[43-45,48] Urgent care visits decreased significantly in 1 study,[43] but neither study found a consistent effect on emergency department visits or hospitalizations.

Three studies examined clinical outcomes for diabetic patients. All found improvements in glycosylated hemoglobin control (2 statistically significant, but only 1 clinically significant)[45,47,48]; 1 found significant improvement in lipid control[45]; and 1 found significant worsening of blood pressure control.[48] A before-after report of advanced access implementation in the VA reported dramatic improvement in a wide variety of clinical performance measures[39]; however, the VA implemented numerous other quality improvement activities during this period that were not accounted for.[53,54] A variety of other outcomes were assessed in 1 or 2 studies each (Table 6).

EFFECT OF SUCCESS OF ADVANCED ACCESS IMPLEMENTATION ON OUTCOMES

We assessed whether outcomes were better for studies with more successful implementations (shorter time to

Table 4. Physician and Practice Outcomes

Source	No-Show Rate, %			*P* Value	Visit Volume, Physician Productivity, and Compensation Outcomes
	Without AA	With AA	Absolute Change		
Mallard et al[50] 2004	43	19	−24	<.001	Productivity 89%→122% (*P* < .001) New patient volume/mo, 78 → 95
O'Connor et al[51] 2006	21	9	−12	<.02	NR
Cherniack et al[49] 2007	18	11	−9	0	NR
Bundy et al[27] 2005	16	11	−5 (95% CI, −10 to −1)	<.05	NR
Lasser et al[41] 2005	17.2	15.4	−1.8 OR, 0.80 (95% CI, 0.74 to 0.86)	<.001	NR
Belardi et al[25] 2004	8.6 → 7.8	9.2 → 6.7	−2.6	NS	Increased RVU/patient/session 1st quarter only (1.32 → 1.51); then back to baseline No change patients/session No change panel size for AA; significant increase for traditional
Salisbury et al[35] 2007	4.8 → 4.7	4.3 → 3.4	−0.9	.85	No change in patients/session; difference 1.2 (95% CI −7.1 to 9.4)
Bennett and Baxley[26] 2009	19.7	19.3	−0.4	NS	NR
Kennedy and Hsu[30] 2003	10	6	−4	NR	Charges/FTE, $11 560→$16 844 Revenue/FTE, $4978→$10 316 Visit volume "increased"
Meyers[31] 2003	Family practice, ~3.7 Pediatrics, ~3.5 Military medicine, ~2.9 Internal medicine, ~1.9	Family practice, ~2.4 Pediatrics, ~2.9 Military medicine, ~4 Internal medicine, 0	Family practice, ~−1.3 Pediatrics, ~−0.6 Military medicine, ~1.1 Internal medicine, ~−1.9	NR	NR
Mehrotra et al[38] 2008	14	14	0	NR	NR
Radel et al[47] 2001	NR	NR	NR	NR	"Financial performance improved"
Solberg et al[43] 2004; Solberg et al[44] 2006; Lewandowski et al[42] 2006	NR	NR	NR	NR	**OFFICE VISITS/PATIENT**[a] CHD, 8.2 → 8.9 (*P* < .001) DM, 7.0 → 7.0 (*P* = .22) Dep, 11.4 → 10.9 (*P* < .001) **TOTAL HEALTH CARE COSTS PER PERSON** CHD, $16 631→$18736 DM, $7607→$8407 Dep, $6409→$7731 **FINANCIAL PERFORMANCE** WRVU per FTE, 2930 → 3980 from 2 y prior to intervention to 2 y after intervention (simultaneous change of physician payment from salary to WRVU-based system) Physician production efficiency ($ paid per WRVU) $44.70→$38.85 Average compensation $123 581→$148 200 per FTE
Subramanian et al[48] 2009	NR	NR	NR	NR	Office visits/patient, OR 1.00 (95% CI, 0.92 to 1.08)

Abbreviations: AA, advanced access; CI, confidence interval; CHD, coronary heart disease: Dep, depression; DM, diabetes mellitus; FTE, full-time equivalent; NR, not reported; NS, not significant; OR, odds ratio; RVU, relative value unit; WRVU, work relative value unit; →, changed to.

[a] Data from Solberg et al[43] (2004). In Solberg et al[44] (2006), results reported as 10.8 → 10.4 (*P* < .01).

third-next-available appointment). There was a positive but nonsignificant correlation between time to third-next-available appointment and no-show rate in the 5 studies reporting both measures (R^2=0.69; *P*=.10). We were unable to perform similar analyses for other outcomes owing to lack of data.

COMMENT

This systematic review investigated the impact of advanced access scheduling on no-show rates, practice finances, patient satisfaction, continuity of care, health care utilization, and preventive care. In summary, among 28 articles describing 24 implementations, we found that the time to third-next-available appointment consistently decreased with advanced access scheduling, although very few studies were able to achieve same-day access. Overall, advanced access yielded neutral to small positive improvements in no-show rates, continuity, and patient satisfaction, while effects on clinical outcomes were mixed. It is worth noting that these studies report outcomes of advanced access as it has been applied in working practices. The limited nature of the benefits might therefore not be attributable to a failure of the advanced access scheduling itself so much as imperfect implementation (as evidenced by the limited number of studies that were able to achieve same-day access). Nonetheless, since most clinicians would not be likely to apply this intervention in a randomized controlled trial setting, it is useful to examine its real-world effectiveness.

Any systematic review is dependent on the quality of the studies it evaluates. The studies included in this analysis were rarely conducted in a rigorous fashion. Only 1 was a randomized trial, and only 6 others had a concurrent control group. The remaining studies were conducted

Table 5. Patient Satisfaction and Advanced Access Implementation

Source	Patient Satisfaction, %			*P* Value
	Without AA[a]	With AA[a]	Absolute Change	
Overall				
Bundy et al[27] 2005	45	61	16 (95% CI, 0.2 to 30)	<.05
Lewandowski et al[42] 2006	84	87	3	NS
Solberg et al[43] 2004	DM 36	DM 55	19	NR
Parente et al[52] 2005	6.21[b]	6.08[b]	–0.13 points	NS
Radel et al[47] 2001	72	95	23	NR
Appointment system				
Salisbury et al[34] 2007 and Sampson et al[36] 2008	52	52	Adjusted OR, 0.93 (95 CI% CI, 0.67 to 1.28)	NS
Bundy et al[27] 2005	37	47	10 (95% CI, –9 to 29)	NS
Lukas et al[46] 2004	74	84	10	.09
Mehrotra et al[38] 2008	53	51	–2	NR

Abbreviations: AA, advanced access; CI, confidence interval; DM, patients with diabetes mellitus only; NR, not reported; NS, not significant; OR, odds ratio.
[a] Percentage of respondents reported as "satisfied" or "highly satisfied" unless otherwise specified.
[b] Mean score on 1-7 scale with 7 indicating highest satisfaction.

Table 6. Clinical Outcomes of Advanced Access

Source	COC, %			*P* Value	Change in Utilization of Urgent, ED, Hospital Care, Without AA→With AA, %	Other Clinical Outcome, %
	Without AA	With AA	Change			
Belardi et al[25] 2004	~75	>90	~15	<.015	NR	NR
Parente et al[52] 2005	69.8	91.4	24.1	<.001	NR	NR
Solberg et al[43] 2004; Solberg et al[44] 2006; Sperl-Hillen et al[45] 2008[a]	CHD 0.66 DM 0.68 Dep 0.60	CHD 0.72 DM 0.73 Dep 0.63	CHD 0.06 DM 0.05 Dep 0.03	<.001 <.001 <.001	**1 OR MORE VISITS TO URGENT CARE** CHD 13.5 → 8.6 (*P* < .001) DM 17.5 → 12.4 (*P* < .001) Dep 31.8 → 22.8 (*P* < .001) **1 OR MORE VISITS TO ED**[b] CHD 51.5 → 50.9 (*P* = .07) DM 14.4 → 15.1 (*P* = .08) Dep 14.9 → 16.9 (*P* = .15) **1 OR MORE ED OR URGENT CARE VISITS** DM 41 → 37.6 (*P* < .001) **1 OR MORE HOSPITALIZATIONS**[b] CHD 58.4 → 57.3 (*P* = .002) DM 9.5 → 9.7 (*P* = .70) Dep 7.7 → 8.9 (*P* = .13) **MENTAL HEALTH ED VISIT OR HOSPITALIZATION** Dep 6.5 → 6.3 (*P* = .34)	**DIABETES QUALITY** HbA_{1c} <7%, 44.4 → 52.7 (*P* < .001) LDL <100 mg/dL, 29.8 → 38.7 (*P* < .001) **Dep QUALITY** Continuation of new medication for 180 d, 46.2 → 50.8 (*P* < .001)
Phan and Brown[32] 2009	UPC 0.56 MMCI 0.49	UPC 0.54 MMCI 0.43	UPC –0.02 MMCI 0.06	0.13 .001	NR	NR
Bundy et al[27] 2005	76	89	13 (95% CI, –7 to 32)	NS	NR	NR
O'Connor et al[51] 2006	75	60	–15	NS	NR	On-time immunization rate, 74 in AA group, 74 in non-AA group
Salisbury et al[35] 2007; Pickin et al[37] 2010[c]	0.43 → 0.46	0.43→ 0.40	Adjusted difference, .003 (95% CI, –0.07 to 0.07)	0.93	NR	Antibiotic prescribing, reduction in monthly prescriptions of 0.9 items/1000 patients in AA group relative to controls (95% CI, –2.2 to 0.4) (*P* = .16)
Meyers[31] 2003	~38	~45	~7	NR	NR	NR
Bennett and Baxley[26] 2009	64.0	68.2	4.2	NR	NR	NR
Subramanian et al[48] 2009	NR	NR	NR	NR	ED or urgent care visits, OR, 0.97 (95% CI, 0.92 to 1.02) Hospitalizations, OR, 0.95 (95% CI, 0.81 to 1.11)	**DIABETES QUALITY** HbA_{1c} –0.12 (95% CI, –0.21 to –0.03) SBP 6.4 (95% CI, 5.4 to 7.5) LDL –0.2 (95% CI –2.0 to 1.5)
Radel et al[47] 2001	NR	NR	NR	NR	NR	**CARDIOVASCULAR QUALITY** LDL <100 mg/dL, 52 → 75 HTN BP control <140/86 mm Hg, 64 → 96 **DIABETES QUALITY** HbA_{1c} ≤7.5, 65.5 → 76.6

Abbreviations: AA, advanced access; BP, blood pressure; CHD, coronary heart disease; CI, confidence interval; COC, continuity of care; Dep, depression; DM, diabetes; ED, emergency department; HbA_{1c}, hemoglobin A1c; HTN, hypertension; LDL, low-density lipoprotein cholesterol; MMCI, Modified, Modified Continuity Index[20]; NR, not reported; NS, reported as not significant; OR, odds ratio; SBP, systolic blood pressure; UPC, Usual Provider Continuity Index[21]; →, changed to.
SI conversion factor: to convert LDL to millimoles per liter, multiply by 0.0259.
[a] COC scores measured by COC index of Given et al.[19]
[b] Data are from Solberg et al[43] (2004). Solberg et al[44] (2006), using same data set, report 1 or more visits to the ED for Dep as 25.6 → 27.3 (*P* = .13) and 1 or more hospitalizations as 19.9 → 21.7 (*P* < .05).
[c] COC scores measured by COC index of Bice and Boxerman.[18]

in a before-after fashion without accounting for secular trends or other concurrent quality-improvement initiatives, making it impossible to isolate the effect of advanced access scheduling on outcomes. This was particularly problematic for the 3 studies set in the VA system and the 4 studies of practices participating in Institute for Healthcare Improvement programs, in which numerous concurrent quality-improvement activities were undertaken. Moreover, the limited reporting of most studies made it difficult to assess the level of advanced access achieved, while lack of statistical analysis often made it difficult to interpret the results. Very few studies included outcomes of clinical relevance.[37,44,45,48,51] The wide variety of practice settings combined with the paucity of data about most outcomes prohibited us from distinguishing which effects were attributable to advanced access itself vs to local context and variability in implementation. Finally, publication bias is always of concern, although we did identify both positive and negative reports.

Although time to third-next-available appointment declined in all studies, one of the most striking findings was the low number of practices that achieved true same-day access. Only a quarter of studies reporting time to third-next-available appointment achieved 2-day access. It is possible that some of the 16 studies that did not report time to third-next-available appointment achieved successful implementations, and it is also possible that individual sites within multisite studies were successful. Nonetheless, on balance, our results suggest that successful implementation of this scheduling system is challenging. Reasons provided by authors for failure included increased demand of new patients owing to physician shortages, difficulty scheduling physicians to match demand, provider resistance to same-day scheduling, unexpected decreases in appointment supply owing to provider illness or departure, expected changes in supply such as maternity leave and vacations, and irregular schedules of medical trainees.[16,25,38] Strategies to overcome these predictable roadblocks have been described,[12,13,55] but they do not seem to have been readily implemented in practice.

No-show rates declined as time to third-next-available appointment declined. However, improvements in no-show rates were less robust than those observed in time to third-next-available appointment and were chiefly seen in studies of underserved populations with a high baseline no-show rate. For practices with lower baseline no-show rates, advanced access did not appear to provide significant benefit. It is possible that there is a "floor" no-show rate below which improvements are unlikely. Regardless, advanced access did not provide the large benefits to no-show rates that have been theoretically postulated.

Surveys show that health care providers fear that advanced access will decrease continuity if patients are encouraged to be seen immediately by whichever physician is available.[16] Our results do not support this concern. Continuity of care decreased markedly in only 1 of 7 studies, a residency site in which irregular house staff schedules made continuity of care extremely challenging when appointments could not be prebooked.[51] Conversely, proponents of advanced access contend that the system will improve continuity by improving each provider's availability.[12,56] Our findings only partially support this theory: advanced access improved continuity in only half of the studies, and in 1 study, the improvement in continuity was only weakly associated with improvements in wait time.[45]

Despite the nearly universal reduction in wait time, patient satisfaction with overall care or with the scheduling system did not consistently improve. Clinicians often assume that shorter wait times for appointments will automatically lead to improved patient satisfaction. In the VA system, patient satisfaction was positively correlated with shorter wait times.[46] However, numerous surveys of patients in the United Kingdom have found that scheduling an appointment at a convenient time is more important to patients than speed of access, unless they are presenting with a new health problem.[34,57-59] These results are consistent among working patients, patients with chronic illness, women, and older patients.[58] Furthermore, one survey found that patients were no more likely to get the type of appointment they wanted (eg, with a particular provider, provider type, or time) in practices with the advanced access system than in those with conventional scheduling systems.[34] In fact, satisfaction decreased 8% for every 10% increase in same-day appointments available.[36] Thus, a strict focus on reducing wait time for appointments by embargoing appointments—such as has been reported in the National Health Service[60]—may not be a patient-centered approach to improving scheduling systems. Although this is not the intent of advanced access, which should be able to accommodate requests for appointments, qualitative studies have found that real-world implementations of advanced access often focus on same-day access to the exclusion of other core principles.[61]

While advanced access was not designed to improve clinical outcomes per se, as with any intervention it is necessary to ensure that it does not harm patients. Additionally, since prompt care and continuity improve clinical outcomes,[62-65] advanced access might be expected to have clinical benefits. Few studies evaluated clinical outcomes, and here the results were mixed. Of the 4 studies analyzing emergency department and/or urgent care use, only 1 showed a decrease in use of these services. Diabetes care was unaffected or mildly improved.[45] On-time immunization rates for children were unchanged.[51] Overall, it does not appear that advanced access in itself is a particularly robust method of improving clinical outcomes. However, we found no compelling evidence of harm.

On the other hand, we did find some evidence to support the concern that some patients may be more likely to be lost to follow-up in an advanced access system.[29] In one study, nearly one-fifth of geriatric patients failed to make follow-up appointments as requested, although preintervention data were not pre-

sented.[49] While our systematic review focused on primary care only, a specialty care practice implementing advanced access noted that 50% of patients failed to call for follow-up appointments, indicating that losing patients to follow-up is of concern in specialty settings as well.[66]

As advanced access scheduling gains popularity, it is important to have a realistic expectation of its potential benefits.[67] We found that most practices attempting advanced access reduce wait time substantially, although few achieve same-day access. For practices with high no-show rates, advanced access appears to yield marked improvements; however, it is less effective for practices with lower baseline no-show rates. Patient satisfaction does not consistently improve and may be contingent on how the advanced access model is applied. Most importantly, data about clinical outcomes and potential harm such as loss to follow-up are lacking. A large randomized trial of open-access scheduling that includes patient outcomes such as satisfaction, continuity of care, quality of care, and health care utilization, along with a rigorous assessment of loss to follow-up, would be valuable to further our understanding of the utility of this scheduling system.

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INVITED COMMENTARY

ONLINE FIRST

Advanced Access—Fad or Important?

Advanced access (AA) burst onto the primary care redesign scene over 10 years ago, led by Murray and Berwick[1] and Murray and Tantau,[2,3] who helped several medical groups implement it and became key advocates and facilitators for its spread. This disruptive innovation in scheduling was widely accepted for multiple reasons: (1) health care was ready for any change that might improve patient satisfaction; (2) AA provided advantages for clinicians and clinic staff as well as patients; and (3) Murray, Berwick, and Tantau provided very specific tools and actions needed to implement it. This readiness for the AA change was reinforced in 2001, when the now famous report from the Institute of Medicine,[4] "Crossing the Quality Chasm," called for attention to 6 domains of quality, including timeliness.