QUERI

Access Management Improvement: A Systematic Review

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PREFACE

The VA Evidence-based Synthesis Program (ESP) was established in 2007 to provide timely and accurate syntheses of targeted healthcare topics of particular importance to clinicians, managers, and policymakers as they work to improve the health and healthcare of Veterans. QUERI provides funding for 4 ESP Centers, and each Center has an active University affiliation. Center Directors are recognized leaders in the field of evidence synthesis with close ties to the AHRQ Evidence-based Practice Centers. The ESP is governed by a Steering Committee comprised of participants from VHA Policy, Program, and Operations Offices, VISN leadership, field-based investigators, and others as designated appropriate by QUERI/HSR&D.

The ESP Centers generate evidence syntheses on important clinical practice topics. These reports help:

- Develop clinical policies informed by evidence;
- Implement effective services to improve patient outcomes and to support VA clinical practice guidelines and performance measures; and
- Set the direction for future research to address gaps in clinical knowledge.

The ESP disseminates these reports throughout VA and in the published literature; some evidence syntheses have informed the clinical guidelines of large professional organizations.

The ESP Coordinating Center (ESP CC), located in Portland, Oregon, was created in 2009 to expand the capacity of QUERI/HSR&D and is charged with oversight of national ESP program operations, program development and evaluation, and dissemination efforts. The ESP CC establishes standard operating procedures for the production of evidence synthesis reports; facilitates a national topic nomination, prioritization, and selection process; manages the research portfolio of each Center; facilitates editorial review processes; ensures methodological consistency and quality of products; produces “rapid response evidence briefs” at the request of VHA senior leadership; collaborates with HSR&D Center for Information Dissemination and Education Resources (CIDER) to develop a national dissemination strategy for all ESP products; and interfaces with stakeholders to effectively engage the program.

Comments on this evidence report are welcome and can be sent to Nicole Floyd, ESP CC Program Manager, at Nicole.Floyd@va.gov.

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TABLE OF CONTENTS

ABSTRACT **4**
Introduction 4
Methods 4
Results 4
Conclusion/Discussion 5

INTRODUCTION **6**

METHODS **7**
Topic Development 7
Technical Expert Panel 7
Search Strategy 7
Study Selection 8
Data Abstraction 8
Quality Assessment 8
Data Synthesis 8
Rating the Body of Evidence 8
Peer Review 9

RESULTS **10**
Literature Flow 10
Description of the Evidence 10
Quality of Intervention Studies 12
Key Question 1: What definitions and measures of intervention success are used, and what evidence supports use of these definitions and measures? 14
Third Next Available Appointment 14
Continuity 15
Patient Satisfaction 15
Other Metrics and Definitions 16
Summary of Findings 16
Quality of Evidence for Key Question 1 17
Key Question 2: What samples or populations of patients are studied, including eligibility criteria? 17
Summary of Findings 18
Quality of Evidence for Key Question 2 18
Key Question 3: What are the salient characteristics of local and organizational contexts studied? 18
Summary of Findings 18
Quality of Evidence for Key Question 3 18
Key Question 4: What are the key features of successful (and unsuccessful) interventions for organizational management of access? 19
Interventions Identified in the Literature 19
Intervention Components 19
Duration of Intervention Data 22
Longer-duration Studies 22
Study Designs Employed 23
Results from Included Studies 23

Wait Times 23
Continuity 23
Other Outcomes 23
Summary of Findings 28
Quality of Evidence for Key Question 4 28
Key Question 5: Are relevant, tested, tools, toolkits, or other detailed relevant material available from successful organizational interventions? 28
Summary of Findings 29
Additional Relevant Literature 29
Modeling Studies 29
Spreading Improved Access across Sweden 30
"Interventions to Improve Veterans Access to Care: A Systematic Review of the Literature" (2011) 30
"Transforming Health Care Scheduling and Access" (2015) 31

SUMMARY AND DISCUSSION 32
Summary of Evidence by Key Question 32
Limitations 32
Publication Bias 32
Study Quality 33
Heterogeneity 33
Research Gaps/Future Research 33
Conclusions 33

REFERENCES 34

TABLES

Table 1. Quality Scores for Intervention Studies 13
Table 2. Components of Interventions Reported in Included Studies 20
Table 3. Studies of Interventions to Manage Primary Care Access 24

FIGURES

Figure 1. Literature Flow Chart 11

APPENDICES

Appendix A. Search Strategies 38
Appendix B. Criteria Used in Quality Assessment 40
Appendix C. Peer Review Comments/Author Responses 43
Appendix D. Evidence Table 48
Appendix E. Citations of Full-text Excludes 55
Appendix F. Measurement of Third Next Available 59

ABSTRACT

INTRODUCTION

Access is a fundamental characteristic of a health care system. All health systems struggle with primary care access. This evidence report was requested by the Office of Analytics & Business intelligence to assess the evidence regarding primary care access management strategies. The key questions asked were:

1) What definitions and measures of intervention success are used, and what evidence supports use of these definitions and measures?

2) What samples or populations of patients are studied, including eligibility criteria?

3) What are the salient characteristics of local and organizational contexts studied?

4) What are the key features of successful (and unsuccessful) interventions for organizational management of access?

5) Are relevant, tested tools, toolkits, or other detailed material available from successful organizational interventions?

METHODS

We searched PubMed & CINAHL from 2005 through September 2016 for titles related to group practice management and access. Searches of included studies were used for articles published earlier. Studies were included if they assessed primary care patients, an intervention to manage access, and reported an access outcome. Intervention studies were assessed for quality using study design and the Quality Improvement Minimum Quality Criteria Set. The data synthesis was narrative.

RESULTS

Our literature search identified 979 titles. From these, and including references selected from included studies, 53 publications were included. Of these, 29 publications assessed 19 implementations of interventions to manage primary care access. All were about Advanced or Open Access. All but 3 studies were published between 2001 and 2010.

Key Question #1. What definitions and measures of intervention success are used, and what evidence supports use of these definitions and measures?

In the studies we identified of management interventions to improve primary care access, the third next available appointment was the most commonly used measure of success (14/19 studies, 74 percent). We identified no empiric data exist linking this choice to any health outcome. The next most commonly used measure of success was continuity (7 studies), followed by patient satisfaction (3 studies). Many publications that discuss access management do not include a definition of access. No evidence supports any measure with clinical outcomes. The third next available appointment measure is believed to be a more stable measure of access than the first or second available appointment.

Key Question #2. What samples or populations of patients are studied, including eligibility criteria?

The patients who have been included in published studies of access management in primary care have not been described in detail. In general, though, they are likely typical of adult patients attending family medicine clinics, given that many patients came from similar contexts, except for the studies specific to VA.

Key Question #3. What are the salient characteristics of local and organizational contexts studied?

Little is known about the local and organizational contexts of practice sites included in published studies of primary care access management interventions. Many sites were academically-affiliated clinics, part of the British system, or in the VA.

Key Question #4. What are the key features of successful (and unsuccessful) interventions for organizational management of access?

All interventions were described by the authors as Advanced Access or Open Access, with 15 of the 19 studies including these phrases in the publication title. The most common intervention components were reducing the backlog of appointments, using fewer appointment types, and producing regular activity report. In 8 studies reporting results of longer than 12 months duration, one study reported initial improvements in access followed by subsequent worsening, one study reported statistically significant decreases in continuity (of uncertain clinical significance), and in 2 implementations across a large number of sites the effect on access was variable.

Key Question #5. Are relevant, tested tools, toolkits, or other detailed material available from successful organizational interventions?

We identified and retrieved 6 tools or guides for improving primary care access, 4 from settings linked to implementation studies: one from a VA setting, 2 from the IHI/Advanced Access group, and one from the English National Health Service. Two additional online tools came from Canada.

CONCLUSION/DISCUSSION

A key finding of this review is that evidence about primary care access management is essentially limited to implementation of Advanced/Open Access, with all but 3 publications coming in a ten-year period of time from 2001-2010. Most studies reported dramatic improvements in access. The most commonly used intervention components were reducing the backlog, using fewer appointment types, and setting goals, but whether these are key features of success cannot be determined from the data. Some studies of longer duration reported more mixed results, with rising wait times and the need for modifications to the access management strategy reported in 2 large and long-term studies. Patient populations and contexts have been described at only a basic level. Five toolkits were identified, most coming from settings described in implementation studies.

EVIDENCE REPORT

INTRODUCTION

Timely access to care is one of the fundamental characteristics of a health system.[1] Access to primary care is important since primary care both diagnoses and treats most common conditions and also acts as the gateway, in systems like VA, to other types of care.

Providing access to care is a struggle for almost all health systems.[2] VA is committed to improving access to primary care without the need to add substantial additional resources. An earlier ESP review from 2011 focuses on interventions to improve Veterans access to care. Among the topics considered were opening new Community-based Outpatient clinics, integrating mental health care into primary care, expanding the use of telehealth, reducing co-payments, etcetera.[3] VA has made some policy changes based on these findings. More recently, the Institute of Medicine released a report, commissioned by VA, entitled Transforming Health Care Scheduling and Access: Getting to Now.[4] This report noted that, while timely access was likely a problem nationwide, there is a lack of evidence to provide setting-specific guidance on what constitutes timely care. Nevertheless, the report concluded that despite deficiencies there are enough data to conclude that several basic principles be followed to improve access to care: matching supply to demand, immediate engagement of patient's needs, patient preference on the timing and nature of care, need-tailored care, surge contingencies, and continuous assessment of changing circumstances.

In addition to these efforts, there is interest in the active management of primary care access as a means to increase Veterans access. Primary care access management involves the consideration of a lot of interacting system parts and goals, including continuity, team roles, and management structures. VA requested this systematic review regarding the evidence about primary care access management strategies to better understand what populations and interventions are being studied and what are the measures used of definitions of intervention success.

METHODS

TOPIC DEVELOPMENT

This topic was developed in response to a nomination by Drs. Stephan Fihn and Joseph Francis in the Office of Analytics and Business Intelligence and Susan Kirsh in the Office of Clinical Operations (10NC). Key questions were then developed with input from the topic nominator, the ESP coordinating center, the review team, and the technical expert panel (TEP).

The aim of this review is to determine what evidence is available to support improved organizational management of access in a multi-level organization such as VA. Considering studies of interventions to improve organizational management of access, the Key Questions nested within this aim are:

1) What definitions and measures of intervention success are used, and what evidence supports use of these definitions and measures?

2) What samples or populations of patients are studied, including eligibility criteria?

3) What are the salient characteristics of local and organizational contexts studied?

4) What are the key features of successful (and unsuccessful) interventions for organizational management of access?

5) Are relevant, tested tools, toolkits, or other detailed material available from successful organizational interventions?

The review was not registered in PROSPERO because it did not fit the PROSPERO format.

TECHNICAL EXPERT PANEL

The plan for and conduct of this review was assisted by input received from a group of technical experts: Susan Kirsh, National Director Clinic Practice Management; Idamay Curtis, Administrative Director of the PACT Demo Lab Initiative; Greg Orshansky, Lead Physician, Primary Care at West Los Angeles VA Medical Center; Danielle Rose, Research Health Scientist at the Center for the Study of Healthcare Innovation, Implementation and Policy; Susan Stockdale, Research Health Scientist at the Center for the Study of Healthcare Innovation, Implementation and Policy; and Lisa Rubenstein, Associate Director, Center for the Study of Healthcare Innovation, Implementation & Policy.

SEARCH STRATEGY

We searched CINAHL (2005 through 9/19/2016) and PubMed (2005 through 3/3/2016) for relevant literature using key terms relating to group practice management and access or accessibility. Other search strategies were investigated that were broader in scope, but they generated much larger numbers of citations (N=3,718 and over 100,000) and no relevant articles were found in a review of the first 500 titles. The final search strategy, as well as the rejected search strategies, are available in Appendix A. In addition to these searches, we also included references from expert recommendations and any relevant citations from screened publications.

STUDY SELECTION

All titles were screened for retrieved citations by the Principal Investigator. Abstracts were then screened for relevant citations. For those abstracts deemed relevant, full-text articles were retrieved and screened. Three types of full-text articles were included. The first type of articles were ones that used the term “access” in the context of primary care and management. The second type included interventions in primary care to increase access via a management strategy. These were screened against the following PICOTS framework, which describes our inclusion criteria:

Study design: Hypothesis testing studies and descriptive studies of access to primary care and management strategies to increase access

Population(s): Primary care patients

Intervention(s): Interventions to manage access to primary care

Comparator(s): Usual care

Outcome(s): Access to care

Timing: No restrictions

Setting: Primary care practitioners in high-income countries with emphasis on USA

The final type of included full-text articles included those that described toolkits.

DATA ABSTRACTION

All data were abstracted by a single reviewer with data checking by second reviewer. Data abstracted from each publication included: definition of access used; evidence to support the definition; description of the sample of patients; setting or context; study design; sample size; duration; results; and data needed to complete the quality assessment.

QUALITY ASSESSMENT

Risk of bias was assessed using criteria developed for quality improvement intervention publications. Publications reporting on intervention studies were assessed using a modified version of the Quality Improvement Minimum Quality Criteria Set (QI-MQCS, see Appendix B).[5]

DATA SYNTHESIS

This is a narrative review.

RATING THE BODY OF EVIDENCE

We rated the body of evidence for Key Questions 1 through 4 based on the GRADE working group.[6] The quality of the evidence was categorized as follows:

High: We are very confident that the true effect lies close to that of the estimate of the effect.

Moderate: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.

Low: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.

Insufficient: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect.

GRADE evaluates the quality of the evidence across all identified studies contributing to the outcome of interest.

PEER REVIEW

A draft version of the report was reviewed by technical experts and clinical leadership. Reviewer comments and our response are documented in Appendix C.

RESULTS

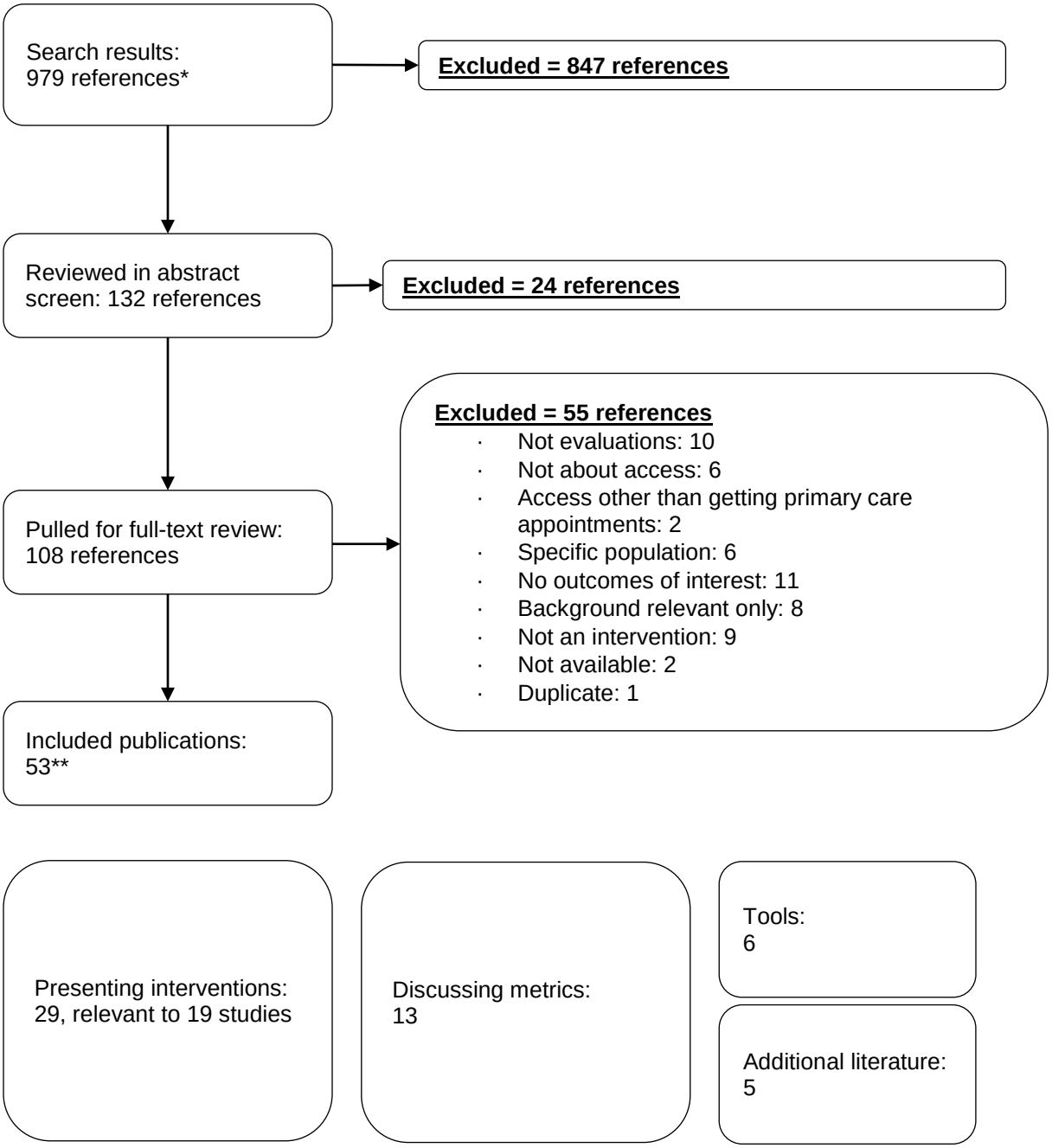
LITERATURE FLOW

Our literature searches and expert recommendations identified 979 potentially relevant citations, of which 132 were included by the reviewer at the title screening. Of these, 108 abstracts were included and obtained as full-text publications. A total of 53 publications met all eligibility criteria. The 55 excluded studies from the full-text review were excluded for the following reasons: 10 were not evaluations and did not provide data for our synthesis; 6 did not discuss access management; 2 addressed access concerns outside the primary care appointment context; 6 were about a specific population; 11 did not include outcomes of interest; 8 were only relevant as background information; 9 were not describing an intervention; 2 were not available; and one was duplicative of an included publication. See Figure 1 for the literature flow. Details of included studies are provided in the Evidence Table (Appendix D). A full list of studies excluded at full-text review is included in Appendix E.

Description of the Evidence

We identified 53 articles that described access management in primary care, 13 articles that discussed metrics,[2,7-18] 29 articles that described 19 interventions to improve access in primary care using management strategies,[19-47] 6 toolkits or tools,[48-53] and 5 additional includes that did not directly relate to a key question.[54-58]

Figure 1. Literature Flow Chart



* Search results were from PubMed (n = 796), CINAHL (n = 103), and experts (n = 80)

** Manuscript reference list includes additional references cited for background and methods plus websites relevant to key questions.

Quality of Intervention Studies

Of the 19 intervention studies included, none met all the QI-MQCS quality criteria (see Table 1). One study met 14 of the 15 potential criteria,[42] 3 studies met 13 criteria,[30,40,45] 2 studies met 12 criteria,[22,29] 4 studies met 11 criteria,[19,26,28,46] one study met 10 criteria,[47] and 8 studies met 9 criteria.[20,21,25,31,32,35,36,43]

All 17 studies met the 5 criterion relating to reporting of intervention rationale, intervention description, study design, data source, and timing. Fifteen studies met the criterion for describing organizational characteristics, 16 studies met the criterion relating to implementation description, 13 studies met the criterion for describing the comparator, 14 studies met the criterion for describing organizational motive, 11 studies met the criterion for reporting study limitations, 10 studies met the criteria for describing adherence, 9 studies met the criteria for describing organizational readiness, 10 studies met the criterion for reporting reach, 6 studies met the criterion for reporting sustainability, and 4 studies met the criterion for reporting on spread.

Table 1. Quality Scores for Intervention Studies

Author, Year	Organizational Motive	Intervention Rationale	Intervention Description	Organizational Characteristics	Implementation	Study Design	Comparator	Data Source	Timing	Adherence	Org Readiness	Reach	Sustainability	Spread	Limitations
Radel, 2001[35]	0	1	1	1	1	1	0	1	1	0	0	1	0	1	0
Kennedy, 2003[26]	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
Meyers, 2003[30]	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
Belardi, 2004[20]	0	1	1	0	1	1	1	1	1	0	0	1	0	0	1
Solberg, 2004[42]	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1
Armstrong, 2006 [19]	1	1	1	1	1	1	0	1	1	0	1	1	0	0	1
Parente, 2005[31]	1	1	1	1	0	1	1	1	1	0	0	0	0	0	1
Boushon, 2006[22]	0	1	1	0	1	1	1	1	1	1	0	1	1	1	1
Steinbauer, 2006[46]	1	1	1	1	1	1	1	1	1	0	1	0	1	0	0
Rohrer, 2007[36]	1	1	1	1	0	1	1	1	1	0	0	0	0	0	1
Mehrotra, 2008[29]	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1
Sampson, 2008[40]	1	1	1	1	1	1	1	1	1	1	1	1	N/A	N/A	1
Bennett, 2009[21]	1	1	1	1	1	1	0	1	1	1	0	0	0	0	0
Phan, 2009[32]	0	1	1	1	0	1	1	1	1	0	1	0	0	0	1
Tantau, 2009[43]	0	1	1	1	1	1	0	1	1	1	0	1	0	0	0
Cameron, 2010[45]	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1
Tseng, 2015[47]	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0
MacCarthy, 2012[28]	1	1	1	0	1	1	0	1	1	1	0	1	1	1	0
Harris, 2015[25]	1	1	1	0	1	1	0	1	1	0	0	1	0	0	1

0 = not reported; 1 = reported

KEY QUESTION 1: What definitions and measures of intervention success are used, and what evidence supports use of these definitions and measures?

We identified 53 publications about access management (see Evidence Table, Appendix D). Of these, 29 publications were related to 19 studies of interventions to improve access. Of these 19 studies, the most often used measure of intervention success was the third next available appointment in 14 studies; continuity in 7 studies; patient satisfaction in 3 studies; the wait time for the next available appointment in 5 studies; utilization in 2 studies; primary care physician access or visits in 3 studies each; and no-show rates in one study. No study reported using waiting times for newly enrolled patients as a measure. Studies could have more than one measure of access intervention success. Thus, in studies of interventions the most commonly used measure of success is the third next available appointment.

Third Next Available Appointment

Of the 14 studies that used this measure of success, 7 studies cited evidence in support of it. The first study said using the third next available appointment was desirable because it was "thought to be more stable" than other choices like the next available appointment.[29] This study cited 2 references in support of this. The first reference is a commentary where Mark Murray and Donald Berwick discussed the intervention called Advanced Access as a means for reducing waiting times and delays in primary care.[13] This commentary includes a box of "Evaluation and Monitoring Measures for Advanced Access," and included in this box is the "third next available appointment," with the following text:

> This statistic is used to measure the number of days a patient has to wait to get an appointment. The third appointment is featured because the first and second available appointments may reflect openings created by patients canceling appointments and thus does not accurately measure true accessibility.

Another study, by the same Advanced Access group, described third next available as an "anchor metric for Advanced Access [because it] more reliably reflects when the schedule actually has substantial capacity."[43] Two other studies describe similar reasoning, without use of any citations.[38,42]

The second reference in support of this measure was a description about how to implement Open Access by Boelke, Boushon, and Isensee.[9] This article includes "Five Key Measures" associated with open access, one of which is the third next available appointment. This measure is chosen, "rather than the first or second, because it provides a more accurate picture of true backlog".

Two studies citing a reference for the use of the third next available appointment referenced a working document from the Institute for Healthcare Improvement (IHI),[21,45] while a third mentioned the IHI without a specific citation.[22]

Descriptions of how the third next available measure was calculated varied, with 8 of the studies using this measure reporting some information on their measurement technique (see Appendix F). Most of these descriptions lacked detail, aside from usually calculating a monthly measure from individual provider-level data. There were 2 studies that did provider richer descriptions. The first that included a detailed description discussed weighting based on provider work

schedule and other scheduling considerations, as well as data collection considerations like collecting at consistent time and day.[29] The other described using a "simulated patient" method where researchers called and attempted to make appointments with primary care providers.[38] These "secret shopper"-style calls targeted both appointments with a particular randomly selected provider as well as with any doctor. One study used self-reported estimates.[28]

Continuity

Two studies used pre-existing indices to measure continuity.[32,38] Other measures of continuity were used without any justification, and include: percentage of patients assigned to a primary care provider who were seen by that provider,[30] percentage of patient visits with primary care provider,[20,21] patients responding "yes" on a survey when asked if they were able to see the provider they ideally wanted to see,[39] or patient continuity by team.[47]

While none of these studies describe justifications, there are numerous studies linking continuity to health outcomes, or other relevant process outcomes.[7,16] A recent evidence summary from July 2016 found 112 studies relating continuity with outcomes relevant to primary care.[16] Of the 14 studies looking specifically at health outcomes, 11 studies showed positive results. All 10 studies of mortality showed reduced mortality with better continuity. When considering the effect of continuity on other process of care measures, this summary found positive results for utilization, care quality, preventive care use, adherence, cost savings, and patient satisfaction. Another recent study found an association between higher continuity of care and fewer hospital admissions,[7] particularly for heavy users. However, it is a challenge to take a concept like "continuity" and turn it into an operational measure of access to assess interventions.

Continuity may also be an important balancing measure to access, and has been shown to be valued by patients when trade-offs between continuity and access were tested.[17] In a discrete choice experiment in England, respondents preferred to wait longer to see a provider with whom they had continuity. This was true for minor conditions as well as for new conditions about which they were less certain, however the preferred wait was longer for the new condition (0.9 versus 2.4 additional days for relational continuity and 1.6 versus 7.8 days for informational continuity, respectively).

Patient Satisfaction

VA uses 4 measures in their Survey of Healthcare Experiences of Patients (SHEP) as measures of access (each with response options of never, sometimes, usually, always):

1. In the last 6 months, when you contacted this provider's office to get an appointment for care you needed right away, how often did you get an appointment as soon as you needed? (primary care)

2. In the last 6 months, when you made an appointment for a check-up or routine care with this provider, how often did you get an appointment as soon as you needed? (primary care)

3. In the last 6 months, when you contacted this provider's office to get an appointment for care you needed right away, how often did you get an appointment as soon as you needed? (specialty care)

4. In the last 6 months, when you made an appointment for a check-up or routine care with this provider, how often did you get an appointment as soon as you needed? (specialty care)

We did not identify any studies assessing the relationship of these SHEP measures with other health outcomes. However, the Consumer Assessment of Health Plans survey (CAHPS) contains composite scores based on questions very similar to the types of questions used by VA to measure access. Experts with the CAHPS group identified 2 articles testing the relationships between these composite scores and outcomes including utilization and quality of care.[2,10] One study focusing on pediatric emergency department use found that patients' ability to get primary care without long waits was statistically significantly associated with decreased odds of non-urgent emergency department use (OR: 0.48; 95% CI: 0.32-0.72).[10] In the second study, Medicare enrollees' clinical quality of care was measured using 6 measures from the Medicare Health Plan Employer Data and Information Set (HEDIS).[2] Five CAHPS composite measures, including the "getting care quickly" composite that is analogous to VA measures, were included in analyses. The "getting care quickly" composite was positively correlated with the quality of care measures for mammography and follow-up within 30 days after hospitalization for mental illness, but the composite was not found to be statistically significant in multivariate analyses when adjusting for the other composite scores and primary care factors.

Aside from its relationship with health outcomes, patient satisfaction has inherent value as an outcome itself, and is considered an important indicator of patient-centered care dimensions like engagement and loyalty.[11]

Other Metrics and Definitions

In addition to these 19 studies of primary care access management interventions, we also identified 9 studies about primary care access management that included a definition of "access." Of these nine, 3 studies used the third next available appointment,[12,15,18] 3 studies used continuity,[18,54,55] and 4 studies used other or aspirational definitions of access.[8,53,56,59]

Other definitions of "access" have not been supported with any evidence; in general, they are not supported at all. In 2 cases, proposed definitions were supported as being compatible with "the triple aim" or simply as being "operational measures important for primary care."

In August 2014, the Evidence-based Synthesis Program Coordinating Center produced a memo on the evidence base for wait times. It concluded that "no studies have evaluated the effect of wait time targets on health outcomes in the VA system or anywhere else."[14]

Summary of Findings

In the studies we identified of management interventions to improve primary care access, the third next available appointment was the most commonly used measure of success. We identified no empiric data exist linking this choice to any health outcome. The next most commonly used measure of success was continuity, followed by patient satisfaction. Many publications that discuss access management do not include a definition of access.

Quality of Evidence for Key Question 1

The quality of evidence supporting the use of the third next available appointment as a measure of success for primary care access management interventions is Insufficient due to the absence of studies assessing its association with health outcomes. However, it is the most widely used measure across systems and across countries.

KEY QUESTION 2: What samples or populations of patients are studied, including eligibility criteria?

In the 19 studies of primary care access management interventions, the patients being studied were those at an academic family medicine practice in 7 studies (at Oregon,[47] Halifax,[45] Baylor,[46] South Carolina,[21] Pennsylvania,[20] Phoenix,[32] and Colorado[26]), patients attending family medicine clinics at 4 different Mayo Clinic locations,[36] patients enrolled in 6 different clinics affiliated with Partners Community Health Care in Massachusetts,[29] children in one pediatric practice,[31] Veterans using the VA nationally,[19,27,41] patients from 17 HealthPartners clinics in Minnesota,[42] 1 military family medicine clinic,[30] patients at 2 multisite organizations in Wisconsin and Rhode Island,[43] patients seeing providers in Family Health Teams or Community Health Centers in Ontario,[25] patients of primary care practices in British Columbia,[28] and patients attending very large numbers of general practice clinics in England.[23,24,33,34,37-40,44] One study did not provide information on the organizations or patients involved.[22] No additional details of the patient populations were provided in the published studies of primary care access management interventions, with 2 exceptions,[21,25] which presented standard demographic details of patients (see Evidence Table, Appendix D). In one study, the eligibility criteria specified patients had to be classified as "chronic-stable" according to the Adjusted Clinical Groups.[36] No other study specified eligibility criteria.

The 3 VA studies describe the advanced clinic access initiative, in which the VA partnered with the IHI with the goal of building a system where patients are able to see their providers when they choose.[19,27,41] Armstrong and colleagues describe the national scope of the initiative, with training collaboratives beginning in 1999.[19] From April 2001 to April 2005, the average number of days until the next-available appointment in primary care fell steadily from 42.9 days to 15.7 days. The authors also present data from one VA health care system to provide a nuanced view of the implementation. This Amarillo case study shows a decline from January 2000 through September 2003 that fits the national trend, with a dramatic drop in days until the next available appointment after the initiation of the advanced clinic access, and barriers like a provider shortage increasing the days until the next available appointment.

The second study presents 3 strategies the VA used as part of the advanced clinic access initiative with case studies to illustrate how those strategies were applied.[41] The strategies include shaping demand, matching supply and demand, and redesigning the system to increase supply. Of the 4 case studies included, 3 occurred outside of primary care and one described a primary care setting using panel management as a "match supply and demand" strategy. In this case study, primary care clinics in the Western New York area used target panel sizes of 1,200 active patients for physicians and 1,000 for nurse practitioners and physician assistants. They reduced average next-available appointment time from 44.9 days in January 2000 to 24.9 days in August 2002. During this time, the clinics also used the other 2 strategies, shaping demand and redesigning the system to increase supply.

The final study focuses on implementation and effectiveness of advanced clinic access at 78 medical centers in 2003.[27] They conducted surveys and interviews to supplement administrative data to better understand the predictors of implementation. They found that implementation varied across sites, and that greater implementation was associated shorter wait times, and higher patient satisfaction in most areas for primary care.

One additional study described the same intervention, the advanced clinic access initiative, in a geriatrics clinic.[60] Although not conducted in primary care, and therefore not eligible for inclusion in this review, this study found a decrease in the number of missed appointments, while there was no significant reduction in the number of patients seen.

Summary of Findings

The patients who have been included in published studies of access management in primary care have not been described in detail. In general, though, they are likely typical of adult patients attending family medicine clinics, given that many patients came from similar contexts, except for the studies specific to VA.

Quality of Evidence for Key Question 2

The quality of evidence for descriptions of the patients included for study in primary care access management interventions is Low. While not described in detail, they are likely typical of adult patients in family medicine clinics.

KEY QUESTION 3: What are the salient characteristics of local and organizational contexts studied?

In the 19 identified studies of primary care access management interventions, the details of local and organizational contexts are very few. Six studies were at American academic medical center clinics,[20,21,26,32,46,47] 9 references (all assessing the same intervention) came from a large-scale implementation of Advanced Access in English primary care,[23,24,33,34,37-40,44] and 3 publications from the implementation of Advanced Care Access in the VA.[19,27,41] Other details from various settings are in the Evidence Table (see Appendix D).

Summary of Findings

Little is known about the local and organizational contexts of practice sites included in published studies of primary care access management interventions. Many sites were academically affiliated clinics, part of the British system, or in the VA.

Quality of Evidence for Key Question 3

The quality of evidence for the local and organizational contexts of sites where primary case access management interventions have been implemented is Insufficient due to lack of description of context in the published studies.

KEY QUESTION 4: What are the key features of successful (and unsuccessful) interventions for organizational management of access?

Interventions Identified in the Literature

Of the 19 studies, all but 4 studies described the intervention of interest as Advanced Access or Open Access in the title of the publications. The 4 exceptions described studies of IHI initiatives, or implementations based on the IHI approach. They were described as the "Idealized Design of Clinical Office Practices"[35], in which "open access policies" were implemented, a Virtual Breakthrough Series on "improving access and office efficiency in primary care,"[22] in which IHI work included Advanced Access, a "Quality Improvement and Innovation Partnership… based on the Institute for Healthcare Improvement Breakthrough Series" which included a module on "advanced access," and a "Practice Support Program… based on the Institute for Health Improvement Breakthrough structured learning series approach" which also included an "advanced access" module. Of note, nearly all of these studies of Advanced/Open Access were published between 2003-2010, and since then we identified only 3 additional studies of Advanced/Open Access.

Intervention Components

Although all studies were related to "Advanced Access" or Open Access", and many referenced the original description by Murray & Tantau[61] or the IHI initiative of Advanced Access, the reporting of the intervention components varied greatly among studies (see Table 2). Some studies reported no components at all, merely stating they had implemented Advanced (or Open) Access, while one study reported as many as 10 components.[29]

In their original description, Murray & Tantau describe 4 "high leverage" points: Reducing backlog (*eg*, temporarily increasing pay or staffing to increase appointment supply in order to decrease the backlog), using fewer appointment types (*eg*, creating a small number of generic appointment types), developing a contingency plan for high demand times, and reducing demand for unnecessary visits. Intervention components targeting these were reported in 6, 8, 4, and 3 studies, respectively. Two studies specifically reported they did not reduce the backlog of patient appointments prior to implementing Advanced Access.

Other commonly reported intervention components were establishing a panel size, setting goals, producing regular activity reports, and provider/patient education. It is very likely that part of the variation between studies in intervention components is due to differences in reporting by article authors.

Murray and Tantau also describe Advanced Access as a philosophy of care where today's work is done today. Assessments of the components implemented in the included studies do not capture the degree to which this philosophy was adopted by the practices. Scheduling mechanisms may be features of Advanced Access, but the broader model is missed if the focus is solely on appointment slots or same-day appointment systems.[34,62]

Table 2. Components of Interventions Reported in Included Studies

	Kennedy, 2003[26]	Meyers, 2003[30]	Belardi, 2004[20]	Solberg, 2004[42]	VA [19]	Steinbauer, 2006[46]	Mehrotra, 2008[29]	NHS[23,24,40***]	Phan, 2009[32]	Cameron, 2010[45]	Tseng, 2015[47]
Original Murray and Tantau Components											
Reduce backlog with extra hours, hold on new patients, extending return visit interval, or temporary staff	N**	X	X	X	X		X	X		N**	
Use fewer appointment types		X	X	X	X	X	X		X		X
Develop contingency plans											
Make arrangements for overflow capacity or provider leave		X			X		X				
Add physician financial incentives for overflow capacity						X					
Reduce demand for unnecessary visits											
Create alternatives to clinic visit such as nurse clinics or nurse telephone follow up			X		X						
Measures to reduce follow-up								X			
Predict and anticipate patient needs					X						
Other Components											
Establish panel size		X			X		X				X
Adjust provider schedules to meet predicted periods of peak demand											
Most appointments available on Monday								X			
Goals and Reporting											
Regular activity report		X		X		X	X	X		X	X
Set goals										X	X
Education											
Patient education/engagement	X	X					X	X		X	
Staff/provider education	X	X					X			X	
Reminding patients of appointments						X	X				
Establish leadership/ QI team							X	X		X	X
Other Miscellaneous Components											

Establish “window” for appointments						X			X		X
Patient access to physician schedules						X					
Establish rules for provider leave		X				X	X				
Establish over-ride for staff to pre-book same-day slots				N**					X		X
Reconfigure telephone system to handle additional capacity or triage		X				N**		X			
Redirect workload from physicians to other providers (nurse, medical assistants, etc.)								X			
Optimize rooms and equipment					X						

*Eight references did not describe any components of their interventions, and are not included in this table as a result[21,22,25,28,31,35,36,43]

** N = these components were specifically reported not to be included for this particular intervention

*** because the sites had variety in components used, noted here are the components that had statistically significantly different uptake between the Advanced Access and control groups

Duration of Intervention Data

Most studies reported short-term access outcomes (see Table 3).

Longer-duration Studies

We identified 8 studies reported access outcomes at more than one year after implementation.[19,21-23,29,32,42,46] Two of these were the large implementations in the English National Health Service and VA. Three others were about implementation in single academic primary care practices. One article described the results of the use of a "virtual breakthrough series" on 17 health organizations, while a separate 17 clinics in Minnesota were described in another implementation. The last article was about implementation in 5 academically affiliated primary care practices in Massachusetts.

The implementation in Massachusetts was described by the authors as open access scheduling following the principles as described by Murray and Berwick and Murray and Tantau.[29] All clinics studied were described as having "fully implemented" the intervention. The primary outcome was the time to the third next available appointment. Secondary outcomes were patient and staff satisfaction, and no-show rates. Within the first 4 months of implementation, the average time to the third next available appointment fell from 21 to 8 days for a "long" primary care visit, and from 39 to 14 days for a "short" primary care visit. However, thereafter in 4 of the 5 clinics waiting times rose, from 8 to 11 days for "long" visits and from 14 to 29 days for "short visits." In 2 clinics, at 2 years the wait times were worse than before implementing open access. Among secondary outcomes, there was no change in the no-show rate or in patient satisfaction with access; however staff perception that access was "very good" or "excellent" increased from 35% to 39%. The authors speculate that their results were due to "unexpected barriers that prevented the practices from fully implementing the model", which included extended provider leave, the difficulty in assessing appointment demand, and a lack of appropriate incentives to increase access.

In one of the 3 articles describing open access in single academic primary care practices, results were reported for 14 months.[21] During this time period, the time for the third next available appointment dropped dramatically, from 31 to 9 days. Despite this, the proportion of no-show appointments did not change, being just under 20% before and after the implementation. The effect on continuity was minimal. These authors also speculated that the reason for lack of improvement on these other 2 outcomes was "we were not able to fully implement an advanced access model". The second article assessing open access scheduling in a single academic primary care practice focused solely on continuity.[32] Using 2 complex measures of continuity, the Usual Provider Continuity Index and the Modified Modified Continuity Index, over an 18-month period of time the authors reported finding decreases in both these indices (meaning worse continuity), and for the Modified Modified Continuity Index this was statistically significant (from 0.489 to 0.429, p reported as = 0.01). The authors attributed this to an increased number of visits by patients to clinicians other than their primary provider. The third article assessing open access scheduling in a single academic primary care clinic reported that the clinic has been able to keep its time to the third next available appointment at 1 day for 2.5 years. The authors also report no change in the no-show rate of 8%.[46]

In the article reporting on the use of the virtual breakthrough series, the authors report that of the 17 organizations that participated, at the end of one year 10 of these had "achieved significant improvement" (defined as being most components of the change packaged had been implemented, and there were improvements in the outcomes of the time to the third next available appointment

and office visit cycle time), and that of these 7 had maintained or improved their gains an additional 6 months later.[22]

The large implementations in the English NHS and in VA were the subjects of numerous evaluations, and summarizing all the results succinctly is challenging. In general, both evaluations showed mixed results. The time to the third next available appointment did improve on average, but substantial proportions of clinic or sites struggled to implement the intervention: in the VA implementation only 32% to 42% of facilities were judged to have fully implemented advanced access in all their clinics;[27] while in the NHS implementation only 66% of practices reported improvements in time to the third next available appointment; for 16% of practices this value was unchanged and in 16% of practices it worsened.[33] The NHS implementation was also the subject a famous "law of unintended consequences" moment, where Prime Minister Tony Blair was made aware on live television of patients' unhappiness at being forced to make appointments for care only on the same day (and thus the practice would report that the wait time for a visit never exceeded 1 day). A published evaluation showed for every 10% increase in same-day appointments in a GP's practice there was an 8% decrease in the number of patients satisfied.[40]

Study Designs Employed

There were no randomized controlled trials. One study used a controlled before-and-after design,[20] while 2 others used a post-only with control group design.[25,36] Five used a pre-post design, while the rest of the studies used a time series design, although there were usually few points before the implementation of the intervention sufficient to establish a baseline.

Results from Included Studies

Wait Times

All studies measuring wait times reported some success, most commonly the time to the third next available appointment. Most studies had a pre-intervention value measured in 10-30 days, although 4 studies had pre-intervention or comparison group values that were 2.5 days,[30]3.6 days,[23] 6.6 days,[25] and 5.20 days,[28] substantially better than the post-intervention values for most other studies. The magnitude of the effect in most studies was quite large: reductions in wait time of more than 50 percent. No study specifically looked at wait times for newly enrolled patients.

Continuity

Seven publications described the mixed effects of access management interventions on continuity of care.[20,21,30,32,38,39,47] Three studies showed improvements in continuity,[20,21,30] one study in a residency clinic found statistically significant decreases in 2 continuity indices,[32] and 3 found no differences.[38,39,47] Measures included the percentage or proportion of patient visits with the designated primary care provider, continuity indices, and patient survey data.

Other Outcomes

One study focused on visit volume per FTE, which increased over the 5 months it was measured.[26]

One study described perceived problems from a staff perspective.[34] In qualitative interviews at 8 NHS practices, the 4 sites adopting Advanced Access described issues such as lower continuity. No studies assessed unanticipated negative consequences such as provider burnout and gaming, nor did they verify their measures relative to either gaming or inadvertent misrepresentation.

Table 3. Studies of Interventions to Manage Primary Care Access

Author, Year Title	Study Design	Duration of Intervention Data	Main Outcome
Radel, 2001[35] "Redesigning clinical office practices to improve performance levels in an individual practice association model HMO"	Time series	1 year	Decrease in wait time for established patient office visit: Site A: 11 days to 2 days Site B: 59 days to 1 day (Site B hired extra staff)
Kennedy, 2003[26] "Implementation of an open access scheduling system in a residency training program"	Time series	5 months	Visit volume per FTE increase
Meyers, 2003[30] "Changing business practices for appointing in military outpatient medical clinics: the case for a true "open access" appointment scheme for primary care"	Time series	4 months	Time to third next available appointment decreased from 2.5 days to 1 day.
Belardi, 2004[20] "A controlled trial of an advanced access appointment system in a residency family medicine center"	Controlled before-and-after	12 months	Time to third next available appointment statistically significantly decreased from 21 days to 4-7 days in the intervention group, whereas it did not change in the control group.
Solberg, 2004[42] "Key issues in transforming health care organizations for quality: the case of advanced access"	Pre-post	2 years	Mean third next available appointment decreased from 17.8 to 9.6 to 4.2 to 3.9 days.
Armstrong, 2005[19] "Reinventing Veterans Health Administration: focus on primary care" Schall, 2004[41] "Improving patient access to the Veterans Health Administration's primary care and specialty clinics" Lukas, 2008[27] "The Implementation and Effectiveness of Advanced Clinic Access"	Time series	Intervention phased in over 2 ½ years, plus 16 months follow-up	Days to next available appointment decreased from 42.9 to 15.7 days.
Parente, 2005[31] "A pre-post comparison of service operational efficiency and patient satisfaction under open access scheduling"	Pre-post	? 3 months post-implementation (timing uncertain)	Wait time for next available appointment decreased from 18.7 to 11.8 days.

Author, Year Title	Study Design	Duration of Intervention Data	Main Outcome
Boushon, 2006[22] "Using a virtual breakthrough series collaborative to improve access in primary care."	Time series	18 months	Time to third next-available fell from 23 days to 10 days (60% reduction) among participating sites.
Steinbauer, 2006[46] "Implementing open-access scheduling in an academic practice."	Pre-post	2.5 years	Time to third next available appointment decreased from 17 to 1 day.
Rohrer, 2007[36] "Impact of open-access scheduling on realized access"	Post-only controlled after	1 year	Patients seen in open access clinics had inconsistent differences in primary care visit or screening visits compared to non-open access clinics.
Mehrotra, 2008[29] "Implementing open-access scheduling of visits in primary care practices: a cautionary tale"	Time series	2 years	Mean time to third next available appointment initially decreased from 21 to 8 days, but then increased from 8 to 11 days. Some practices were worse at 2 years compared to baseline. No-show rate stayed constant at 14 percent.
Harris, 2015[25] "Impact of a quality improvement program on primary healthcare in Canada: A mixed-method evaluation"	Post-only controlled after	2 years (no long term data analyzed)	Mean number of days in QIIP group was lower than the control group (5.3 versus 6.6) but this difference was not statistically significant.
MacCarthy, 2012[28] "Improving primary care in British Columbia, Canada: evaluation of a peer-to-peer continuing education program for family physicians"	Pre-post	8 weeks	Statistically significant decreases in urgent appointments (1.21 mean days less), regular appointments (3.34 mean days less), and third next available appoints (3.40 mean days less) were found comparing wait times before and after the advanced access learning module.

Author, Year Title	Study Design	Duration of Intervention Data	Main Outcome
Sampson, 2008[40] "Impact of same-day appointments on patient satisfaction with general practice appointment systems Pickin, 2004[33] “Evaluation of advanced access in the national primary care collaborative” Windridge, 2004[44] “Problems with a 'target' approach to access in primary care: a qualitative study” Dixon, 2006[23] "Advanced access: more than just GP waiting times?" Goodall, 2006 [24] "Implementation of Advanced Access in general practice: postal survey of practices” Salisbury, 2007[37] “Does Advanced Access improve access to primary health care? Questionnaire survey of patients” Salisbury, 2007[39] “An evaluation of Advanced Access in general practice” Salisbury, 2007[38] "Impact of Advanced Access on access, workload, and continuity: controlled before-and-after and simulated-patient study." Pope, 2008[34] "Improving access to primary care: 8 case studies of introducing Advanced Access in England."	Time series	1 to 3 years	Mean time to third next available appointment decreased from 3.6 to 1.9 days. Qualitative studies with patients indicated some dissatisfaction with being able to schedule an appointment on any day other than day of the telephone call.
Bennett, 2009[21] “The effect of a carve-out advanced access scheduling system on no-show rates”	Time series	14 months	Time to third next available appointment decreased from 30.7 to 9.0 days. No-show rate did not change (between 18-24 percent).

Author, Year Title	Study Design	Duration of Intervention Data	Main Outcome
Phan, 2009[32] "Decreased continuity in a residency clinic: a consequence of open access scheduling."	Pre-post	2 years (1 pre, 1 post)	Continuity worsened, with the Usual Provider Continuity Index (UPC) dropping from 0.59 to 0.55 (not statistically significant) and the Modified Modified Continuity Index (MMCI) decreasing from 0.51 to 0.44 (p=0.001).
Tantau, 2009[43] "Accessing patient-centered care using the advanced access model."	Time series	7 months for appointment delays 20 months for no-show rate	Appointment delays at one site were reduced over 7 months from an average of 25 days to an average of 8 days. The no-show rate at another site fell from an average of 30 % to less than 15% over 20 months.
Cameron, 2010[45] “Adoption of open-access scheduling in an academic family practice”	Time series	9 months	Time to third next available appointment decreased from 13.7 to 3.6 days. No-show rate dropped from 3 percent to 2 percent.
Tseng, 2015[47] “Implementation of advanced access in a family medicine residency practice”	Time series	?2 months (timing uncertain)	Time to third next available appointment “trended down” from about 10-20 days to 1-10 days for different clinics.

Summary of Findings

All interventions were described by the authors as Advanced Access or Open Access, with 15 of the 19 studies including these phrases in the publication title. The most common intervention components were reducing the backlog of appointments, using fewer appointment types, and producing regular activity report.

Quality of Evidence for Key Question 4

We judged the quality of evidence for intervention components as Low, due to heterogeneity across studies, the lack of published unsuccessful interventions to compare components, and the high likelihood of publication bias with respect to the reporting of components.

KEY QUESTION 5: Are relevant, tested tools, toolkits, or other detailed material available from successful organizational interventions?

We identified a 2016 systematic review by Janamian and colleagues that identified online tools and resources to support organizational improvement in primary care.[50] This systematic review scored 6 out of 11 using the AMSTAR quality criteria.[63] The authors searched CINAHL, Embase, and PubMed from January 2004 through December 2013, as well as conducting a grey literature search for materials from as early as 1992. Their database search identified 1,900 records after duplicates were removed, which contributed 109 studies of 76 tools or resources meeting the inclusion criteria. The grey literature search identified an additional 186 tools or resources meeting the preliminary inclusion criteria. From both the database searches and grey literature, a combined 53 tools or resources scored highly on the appraisal of accessibility, relevance, utility, and comprehensiveness, and were considered part of the final set of tools and resources. We searched these 53 and identified 4 tools relevant to primary care access management, of which 2 were no longer available online.

The first tool we were able to retrieve is a 162-page guide, possibly designed for or influenced by the goal to improve access in NHS GP practices by the NHS Practice Management Network.[53] The guide is divided into sections of the following: do you understand your demand?; managing and meeting demand; the practice environment; telephony; ensuring a patient-focused service; understanding your community; communications; patient engagement; and change. These sections include a series of step-by-step guides, case studies, and tips.

The second tool was available online, and was a website comprised of resources relating to VA's patient aligned care teams (PACT), a patient-centered medical home model.[64] These resources include links to VA and non-VA materials, including: a patient-centered medical home concept paper; 10 things you can do now list; engaging your team: the first step towards shared innovation; make room for patient-centered care; analyze tasks for the patient-centered medical home; and useful non-VA website links.

In addition to these tools from the systematic review by Janamian and colleagues, we identified 4 tools from content experts.[48,49,51,52] The first was a commentary describing the role of panel size in balancing the supply of appointments with patient demand, as well as how to calculate panel size and make adjustments.[52] The other 3 tools provided resources like case studies, publications, details on how to calculate measures related to access, and information on key concepts relating to access (*eg*, mapping flow, creating contingency plans) on websites from the Institute for

Healthcare Improvement,[49] Health Quality Ontario's Advanced Access and Efficiency for Primary Care,[51] and Alberta Access Improvement Measure group.[48]

Summary of Findings

We identified and retrieved 5 tools or guides for improving primary care access, 4 from settings linked to implementation studies: one from a VA setting, 2 from the IHI/Advanced Access group, and one from England. One additional online tool came from Canada.

ADDITIONAL RELEVANT LITERATURE

We identified 5 publications that did not fit as evidence in the Key Questions, but nevertheless seemed to provide information that is relevant, and are included in their own section here. Four of the publications were modeling studies, and therefore were not "interventions" and one publication was about how improved access was spread across Sweden. In addition to these included publications, 2 reports also merit discussion as background: a prior VA review on interventions to increase Veteran access, and a VA-sponsored Institute of Medicine report on improving access and wait times.

Modeling Studies

One publication modeled what the "right patient panel size" is for primary care.[56] This study was done in the context of advanced access, where the goal is for all patients desiring an appointment with a specific provider be accommodated by that provider on that day. This model starts with the observation that demand is not constant from day-to-day, and if the capacity is present to serve, say, exactly 10 patients a day, then a series of days that alternate between 9 and 11 patients requesting an appointment that day will inevitably lead to a growing backlog of patients. This is because the extra service capacity available on a day when only 9 patients seek care cannot be transferred to the next day and is therefore lost. These authors call "safety capacity" the amount of available capacity in excess of average demand, which acts as a buffer against variable increases in demand. The authors developed a model, and then present example panel sizes for primary care based on the existing number of daily slots and the desired "overflow frequency", meaning the number of days the individual clinician would need to work extra in order to see all the patients, based on seeing patients all 5 days a week. For the situation where there are 20 daily appointment slots for a clinician, and the "overflow frequency" is set at 10% (meaning 1 out of every 10 days the clinician will need to work extra time to see all patients that day), then the formula calculates the panel size as 2053.

Another publication compared traditional scheduling with open-access scheduling performance under a variety of parameters.[57] These included varying the no-show probability, expected workload, length of the workday, overtime surcharge, panel size, and whether a doctor must stay for the whole work day or leave after the last patient. Open-access scheduling outperformed the traditional scheduling approach almost all scenarios the model tested. The exception where traditional scheduling performed better was in the case where the no-show probability was set to less than 5 percent.

Two publications, with the same lead author, modeled how access and continuity could be improved. The first of these used actual data from Mayo clinics to model how re-allocating group practice patients could improve capacity. Patients were classified by age and gender into 28 different categories. By re-allocating patients such that case-mix is evenly distributed across

clinicians in the group, wait times were decreased by 40% and continuity was increased by 40%.[54] The second study by this author modeled when pre-scheduled appointments are best made within the day to achieve increases in access and continuity. Using actual data from a 3-provider family medicine clinic, the authors concluded that a design which clusters all pre-scheduled appointments into 2 blocks – one early in the morning, the other early in the afternoon – is the best in terms of access, continuity, and the ability to accommodate some patients that can only have morning or only have afternoon appointments. [55]

Spreading Improved Access across Sweden

We identified one article that was mostly about how the authors adapted the Institute for Healthcare Improvement Breakthrough model for advanced access and first improved access in one section of Sweden, and then successfully spread it nationwide.[58] Details of the intervention at specific sites are not presented, rather the intervention is described as 4 "learning sessions" where teams from various clinics "focus on identifying their own access problems" and "analyze survey results," "tell each other their own stories," and "teach each other." The article then describes the stepwise spread of the intervention to other counties in Sweden, with some variability in the results (approximately 20% of participating teams showed no improvement in access).

"Interventions to Improve Veterans Access to Care: A Systematic Review of the Literature" (2011)

This review was conducted by the Minneapolis VA Evidence Synthesis Program.[27] The Key Questions were;

Key Question 1. What is the evidence in Veterans' ability to obtain needed health care (*ie*, access) contributes to variation in system-level (*eg*, utilization, satisfaction) or patient-level (*eg*, quality of life, functional ability, mortality) outcomes?

Key Question 1A. Does the effect of access on system- and/ or patient-level outcomes differ by patient, treatment, or setting characteristics?

Key Question 2. What interventions have been successful in improving health care access for patient populations with reduced health care access?

Key Question 2A. Have interventions that improved health care access led to improvements in system-level and patient-level outcomes?

The authors searched multiple databases from 1990 to 2010, and identified 23 articles relevant to Key Question 1 and 26 articles relevant to Key Question 2. For Key Question 2, among the 26 articles there were 5 RCTs. Studies were categorized as the opening of Community Based Outpatient Clinics (6 articles), primary care mental health integration (6 articles), intensive case management (2 articles), use of telemedicine (4 articles), outreach (1 article), decreasing co-payments (4 articles), and 3 other articles outside this classification scheme. All articles reported an association between the intervention and at least one measure of access (actual, perceived, or satisfaction with access). Limitations of the evidence base were a paucity of well-controlled studies and that only 6 articles reported any patient-level outcomes.

"Transforming Health Care Scheduling and Access" (2015)

This report from the Institute of Medicine (now the National Academies of Science, Engineering, and Medicine) was sponsored by VA.[4] The charge was to assess the range of experiences nationally and to identify existing standard and best practices. Key findings of the report were that there is insufficient evidence to support any particular measure of access and timeliness, and that more work needs to be done to establish standardized measures. In Chapter 4, "Building from Best Practices," with respect to primary care 2 "best practice" examples were presented: open access/same-day scheduling; and "the smoothing flow scheduling model." The latter is presented with an example from Louisiana, with the citation of a New Orleans newspaper article. The general principle with respect to "scheduling practices… to minimize the number of appointment types in order to streamline patient visits" is a commentary that discusses this method primarily in the context of surgical procedure scheduling.

SUMMARY AND DISCUSSION

SUMMARY OF EVIDENCE BY KEY QUESTION

Key Question #1. What definitions and measures of intervention success are used, and what evidence supports use of these definitions and measures?

In the studies we identified of management interventions to improve primary care access; the third next available appointment was the most commonly used measure of success. We identified no empiric data exist linking this choice to any health outcome. The next most commonly used measure of success was continuity, followed by patient satisfaction. Many publications that discuss access management do not include a definition of access.

Key Question #2. What samples or populations of patients are studied, including eligibility criteria?

The patients who have been included in published studies of access management in primary care have not been described in detail. In general, though, they are likely typical of adult patients attending family medicine clinics, given that many patients came from similar contexts, except for the studies specific to VA.

Key Question #3. What are the salient characteristics of local and organizational contexts studied?

Little is known about the local and organizational contexts of practice sites included in published studies of primary care access management interventions. Many sites were academically affiliated clinics, part of the British system, or in VA.

Key Question #4. What are the key features of successful (and unsuccessful) interventions for organizational management of access?

All interventions were described by the authors as Advanced Access or Open Access, with 15 of the 19 studies including these phrases in the publication title. The most common intervention components were reducing the backlog of appointments, using fewer appointment types, and producing regular activity report.

Key Question #5. Are relevant, tested tools, toolkits, or other detailed material available from successful organizational interventions?

We identified and retrieved 6 tools or guides for improving primary care access, 4 from settings linked to implementation studies: one from a VA setting, 2 from the IHI/Advanced Access group, and one from England. Two additional online tools came from Canada.

LIMITATIONS

Publication Bias

While data limitations prevent us from performing a statistical test of publication bias, such bias is almost certainly present, as less-than-successful implementations are unlikely to be written up for publication. Even successful implementations may not be written into reports or materials that would be identified by literature synthesis techniques, and these would also be missed in our process. Certainly there must have been more than the 17 implementations reported here of

Advanced/Open Access, and we don't know anything about the contexts or success of these unpublished implementations. For instance, the Cleveland Clinic website states that the Clinic made 1.3 million same-day appointments in 2016, but no peer-reviewed evaluations of their program were found.[65]

Study Quality

The quality of studies was variable. The main limitations were lack of a sufficient pre-intervention time period for the main outcome measure (to establish a baseline), and lack of reporting of intervention components and contexts.

Heterogeneity

Nearly all studies reported dramatic improvements in the measure of wait time. Nevertheless, heterogeneity is difficult to determine because reporting of contexts and implementation components is poor.

Since contexts are poorly reported, most of the results are of uncertain applicability to the VA, with the exception of the 2 studies performed in VA.

RESEARCH GAPS/FUTURE RESEARCH

The most important research gaps include better reporting of intervention components and contexts, longer period of follow-up time, and a systematic examination for other impacts of the primary care access management strategy on system outcomes other than the third next available appointment. As VA works to develop and field new measures for patient-reported access,[66] understanding how these relate to system outcomes will also be important.

CONCLUSIONS

There is a modest body of evidence about primary care access management strategies, but most of it is now more than 6 years old and all of it is about one particular strategy, Advanced/Open Access. Most studies report few contextual details, and reporting of intervention components is highly variable. The lack of substantial additional hypothesis-testing studies of the implementation of Advance/Open Access in the past 6 years is a marked contrast to the period 2003-2010, when 15 studies were reported, and suggests that something has shifted in the perception of Advanced/Open Access since 2010 or that practitioners doing work in this area may not be pursuing publications. If other primary care access management strategies exist, then they should be subject to hypothesis-testing studies.

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APPENDIX A. SEARCH STRATEGIES

FINAL SEARCH STRATEGY

CINAHL search (starting in 2005, conducted on 9/19/2016)

((MH "Group Practice+" (exploded) OR "group practice") AND manag*) OR MH "Private Practice Management" OR MH "Practice Management Information Systems" OR "practice management" as keyword

AND

MH "Health Services Accessibility+"(Exploded) OR (health* AND service* AND access*)

Limited to English only and from 2005-2016

PubMed (starting in 2005, conducted on 3/3/2016)

("Group Practice"[Mesh] OR group practice*[tiab) AND (management[mh] OR management[tiab] OR manages[tiab] OR managing[tiab] OR manage[tiab])

OR

"Group Practice/organization and administration"[Mesh]

OR

"Practice Management"[Mesh] OR practice manag*[tiab]

AND

"Health Services Accessibility"[Mesh] OR access[ti] OR accessing[ti] OR accessed[ti] OR accessib*[ti]

English only

REJECTED SEARCH STRATEGIES

PubMed, limited to English language (starting in 2000, conducted on 10/11/2016)

((primary health care[mh] OR primary care[tiab]) AND practice[tiab]) OR family practice[mh] OR "family practice"[tiab]

AND

"Health Services Accessibility"[Mesh] OR access[tiab] OR accessing[tiab] OR accessed[tiab] OR accessib*[tiab]

AND

organization*[tiab] or (organization and administration[sh]) OR management[majr] OR management[tiab] or manages[tiab] OR managing[tiab] OR manage[tiab]

This search generated 3,718 citations. In a sample of 500 no potential include citations were identified.

This same search was re-run after removing the terms:

((primary health care[mh] OR primary care[tiab]) AND practice[tiab]) OR family practice[mh] OR "family practice"[tiab]

This search generated over 100,000 citations. Screening this many titles would not be feasible.

APPENDIX B. CRITERIA USED IN QUALITY ASSESSMENT

NOTE: For this review we modified the criteria below by removing the health outcomes domain (#11, in grey and italics). Included interventions were only scored a maximum of 15 as a result.

Domain	Minimum standard	Score
1. Organizational Motivation: Organizational problem, reason, or motivation for the intervention ☐Consider quality of care problems; organizational problems; regulations, legal constraints, and external financial incentives at the target organization; or organizational motivation.	Names or describes at least one motivation for the organization's participation in the intervention	Not met Met
2. Intervention Rationale: Rationale linking the intervention to its expected effects ☐Consider citations of theories, logic models, or existing empirical evidence that links the intervention to its expected effects.	Names or describes a rationale linking at least one central intervention component to intended effects	Not met Met
3. Intervention Description: Change in organizational or provider behavior ☐Consider the presented details that describe the change in the delivery of care, provider behavior, or structure of the organization needed to replicate the evaluated intervention including the involved key personnel.	Describes at least one specific change in detail including the personnel executing the intervention	Not met Met
4. Organizational Characteristics: Demographics or basic characteristics of the organization ☐Consider environment (*eg,* urban/rural, academic/non-academic), type of care (*eg,* primary care), size of the organization, patient mix, staff mix, or reimbursement type.	Reports at least 2 organizational characteristics	Not met Met
5. Implementation: Temporary activities used to introduce potentially enduring changes ☐Consider types of staff involved, activities or methods used such as pilot testing or Plan-Do-Study-Act (PDSA) cycles, staff education, and involvement of stakeholders in introducing the intervention.	Names at least one approach used to introduce the intervention	Not met Met
6. Study Design: Study design and comparator ☐Consider the type of evaluation (*eg,* post-only, pre-post, time series, parallel control group, randomized groups; same participants assessed multiple times or different samples) / how the authors evaluated whether the intervention worked	Names the study design	Not met Met
7. Comparator: Information about comparator care processes ☐Consider details about the control group or the status quo without the intervention (even if there was no formal control group / data), *eg,* the existing standard of care / routine care / before the intervention was introduced, or care processes used in the control group.	Describes at least one key care process	Not met Met

8. Data Source: Data source and outcome definition ☐Consider the data sources (*eg,* routine hospital data, data collected by the study investigator), the data collection method (*eg,* survey, interview, objective/subjective measurement) and the outcome of interest is defined (*eg,* definition of a reportable patient fall).	Describes the data source and defines the outcome of interest	Not met Met
9. Timing: Timing of intervention and evaluation ☐Consider the clarity of the timeline of the intervention, *eg,* when introduced, when fully implemented, when evaluated relative to the intervention implementation status, and a clear indication of whether baseline data (defined as before the intervention was introduced) was present.	Describes the timing of the intervention and evaluation to determine the presence of baseline data and the followup period after all intervention components were fully implemented	Not met Met
10. Adherence / Fidelity: Adherence to the intervention ☐Consider reporting of compliance with the intervention for the duration of the study, fidelity data on intervention use, or described mechanisms that ensures compliance (*eg,* provider reminder integrated in electronic health record that cannot be skipped).	Reports fidelity information for at least one intervention component, or describes evidence of adherence or a mechanism ensuring compliance to the intervention	Not met Met
11. Health Outcomes: Patient health-related outcomes *☐Consider patient and non-professional care-giver health-related outcomes (including eg, quality of life), but exclude satisfaction, provider-behavior (eg, number of diagnostic tests ordered, knowledge) and process improvements.*	*Reports data on at least one health-related outcome*	*Not met* *Met*
12. Organizational Readiness: Barriers and facilitators to readiness ☐Consider reported QI resources and culture (*eg,* existing QI committee, leadership commitment, prior QI experience, staff attitudes, and education and decision support resources) and results of barriers and facilitator assessments.	Reports at least one organizational-level barrier or facilitator	Not met Met
13. Penetration / Reach: Penetration / reach of the intervention ☐Consider the number of units or sites participating in the intervention compared to the available / eligible units (*eg,* the number of participating sites without knowing how many sites were initially approached / were eligible is not sufficient).	Describes the proportion of all eligible units who actually participated	Not met Met
14. Sustainability: Sustainability of the intervention ☐Consider discussions of sustainability, reference to organizational resources (*eg,* costs and necessary commitments) and policy changes needed to sustain the intervention after withdrawal of study personnel and research resources, evidence of enduring changes (*eg,* automated electronic reminders), or an extended duration of the intervention period as evidence of sustainability.	Describes the sustainability or the potential for sustainability	Not met Met
15. Spread: Ability to be spread or replicated	Describes the potential for	Not met

☐Consider evidence of spread or failure to spread and large rollouts; available resources such as a toolkits, how-to manuals, protocols, or booklets that describe the intervention in detail and could facilitate spread and replication; or discussions of spread potential.	spread, existing tools for spread, or spread attempts / large-scale rollout	Met
16. Limitations: Interpretation of the evaluation ☐Consider whether the interpretation of the reported findings takes the study design (*eg,* the lack of comparator) or other evaluation limitations into account; refers to the presented data (not future research / developments or intervention limitations)	Reports at least one limitation of the design / evaluation	Not met Met

Note: QI = Quality improvement. The intervention and the outcome of interest need to be determined before scoring.

APPENDIX C. PEER REVIEW COMMENTS/AUTHOR RESPONSES

Comment	Response
Although ref 41 describes VA's ACA initiative, the publication is an abbreviated version of the complete report which is readily available. http://www.researchgate.net/publication/228478818 This report has much more detail re: context.	We actually used the full report but erroneously cited the abbreviated version. This has been corrected.
There are additional modeling studies that are relevant, *eg,* Robinson LW, Chen RR. A comparison of traditional and open-access policies for appointment scheduling. Manufacturing & Service Operations Management 2010;12;330-346.	We have now included this in our modeling studies section, our search did not identify this article.
There is much going on in the world of improving access than is reflected in the academic literature. For example, the Cleveland Clinic made 1.3 million same day appointments in 2016 and it is possible to get a same day or next day appointment with a specialist - maybe not the individual you wanted, maybe not in the most convenient location, and maybe with a relevant specialty but not the one requested, *eg,* seeing a neurologist for headache when you asked for a neurosurgeon. I am unaware that this has been published in any academic literature and it may not stand up to scrutiny if evaluated carefully, but this type of information would still be informative. There are almost certainly many other similar efforts going on.	We agree that the possibility of publication bias in this literature review is a limitation, and cite this example when we discuss this issue.
Take a closer look at CAHPS literature (both peer reviewed and 'gray') to see usefulness of patient self report as an access measure.	We asked the Principal Investigator of CAHPS (Marc Elliott) for this information and he identified the 2 citations we included. This topic is not a specific key question for this report and we therefore did not do a systematic search on it, but trust the CAHPS PI to identify the relevant research.
What about use of "Secret Shopper calls" - a technique used by McWilliams to assess ACOs and by the California Health Foundation in a recent report?	This comment is about methods for evaluating access, and that was not the subject of our search, which was about actual evaluations, meaning we are limited to studies evaluating access management interventions. In the included studies, the evaluation of the NHS Advanced Access did use secret shopper type techniques and this is noted in the text.
Can we extract - or extrapolate - insights from recent PCMH demonstrations within and outside of VHA?	We did review the PACT Demo Lab materials that were assembled for the related Access Expert Panel as a part of our original material collection.

Comment	Response
Is there any indication of bias in our synthesis of the evidence? Yes - Note: I clicked on the Yes in order to make a comment, not with the idea of impugning anyone's integrity. The primary bias to which I am referring is the bias inherent in the method; The bias is that the method privileges certain things as "evidence." Once this method was chosen, it was conducted in an unbiased fashion. That said, I was very pleased to see the section entitled "additional relevant literature." However, there is another type of bias that may be present - academic bias. On page 34: "The lack of substantial additional hypothesis-testing studies of the implementation of Advance/Open Access in the past 6 years is a marked contrast to the period 2003-2010, when 15 studies were reported, and suggests that something has shifted in the perception of Advanced/Open Access since 2010." Alternatively, something has shifted in the perception of academic publication; practitioners who are doing work in the area may not think that academic publication is of value. (in my experience as a professor in both a medical school and business school, the lowest level of evidence perhaps, the research-practice divide is greater in management than it is in medicine.)	An interesting point that we have incorporated with this statement.
This Cochrane type review follows that method just fine. The bigger question is to what extent this approach meets the aim of the review "to determine what evidence is available to support improved organizational management of access in a multi-level organization such as VA." First, this approach privileges certain statements as evidence and it is a rather narrow view. Second, I have serious doubts that this approach really helps when dealing with such complex social interventions as implementation of advanced/open access. Such interventions are extremely context-dependent and the evidence hierarchy privileges context independent knowledge. In addition, sample sizes are by necessity rather small which makes it difficult to randomize out differences in context. The question for the manager of clinics (and I was one) is not so much what works ON THE AVERAGE, but what works for whom under what circumstances, *ie* where there are intervention by context interactions.	We first note that had this been a Cochrane review, we would have excluded nearly every study, as there were no randomized controlled trials. The point about “what is evidence” is a valid one. We have expanded our discussion of publication bias to be more inclusive of this point. We produced the AHRQ report entitled “Assessing the Evidence for Context-Sensitive Effectiveness and Safety of Patient Safety Practices,” which highlights the importance of context, and describes key features of context which should be measured and reported. We are attuned to the reviewer’s concerns about context-dependent interventions, and we collected context information to the extent possible. Unfortunately, a systematic review can only describe that which was included in the original publications, which is why we described this as a limitation.

Comment	Response
I find it astonishing that our approaches to improving access have so little grounding in evidence. That itself is an important finding, although how that should influence policymaking is tougher to assess. Should more research be done? Should our policy interventions occur in a stepwise fashion allowing for evaluation along the way? Should we even abandon standard access metrics altogether to look at something completely different, such as health outcomes? (One possible example to look at would be ACSC Hospitalizations). I was surprised with the "I" recommendation for TNA with no discussion about the relative merits of CAHPS Access items, which currently are the only consistently supported Access measure by NQF and NCQA. Most of the studies were done prior to wide adoption of CAHPS so the relative paucity of that metric is not an indicator of its inadequacy. I have also seen more recent literature that used Secret Shoppers to assess actual access in primary care offices - surprising to me that this technique wasn't mentioned, although it has been used to assess impact of health reform in MA and CA. Finally, it seems to me that this review focused largely on the IHI Open Access/Advanced Access model rather than other approaches to address Access. I think one important finding is that longer duration studies were not able to show sustainment of gains. I worry that this paper demonstrated too much "anchoring" on a single approach and that the literature search may have omitted other potentially valid alternatives (one example that pops into mind is the emerging literature on "Minute Clinics" which could be a useful means to supplement primary care).	This first comment is directed at policymakers and not the report per se. The next comment is a result of the difference between the question we were given “What definitions and measures of intervention success are used?” and the broader question “What are measures of access?” The former question restricts our scope to studies that evaluated a primary care access management intervention. The latter is a broader question that was not in our scope. Perhaps the reviewer could request to the ESP Coordinating Center a need for an ESP report on measures of access. As above, these Secret Shopper studies are studies of access in general, and not studies of evaluations of interventions to improve primary care access; hence they are not in our scope. We note that we were not anchored in any particular approach. We were charged with identifying evaluations of interventions to improve primary care access. As it turns out, nearly all of the published studies identified were about Advanced Access.
This is an excellent product. No substantive criticism or suggestions. A few minor typos: page 23 lines 25 and 52 page 24 line 5 page 32 line 16	These have been corrected, thank you for pointing them out.
• There have been some evaluations of educational initiatives to adopt advanced access and/or improve access in primary care in Canada. These may not meet criteria for the review but may be worth mentioning in the “additional relevant literature” section: o McCarthy et al. “Improving primary care in British Columbia, Canada: evaluation of a peer-to-peer continuing education program for family physicians. BMC Medical Education 2012 o Harris et al. “Impact of a quality improvement program on primary healthcare in Canada: A mixed-method evaluation” Health Policy 2014	Thank you for these suggestions, they do meet our criteria and we have incorporated them.

Comment	Response
I was struck by the finding that TNA was the most commonly used measure of success for access interventions but there are no empiric data linking this choice to a health outcome. It would be helpful to understand more details on how TNA was measured. Was TNA measured for each physician in the clinic and then mean or median reported? Was TNA measured on the same day and time of the week (*eg,* if measured on Monday, TNA always looks better than on Friday if weekends are included)? Were weekends included in the measure?	We have now added more details about TNA measurement in the text and an appendix.
The section on page 14 related to continuity is sparse. There are numerous studies linking continuity to health outcomes and these should be cited. Please see a recent review done in Alberta: http://www.topalbertadoctors.org/file/top--evidence-summary--value-of-continuity.pdf . There was also an excellent study recently published in the BMJ on continuity of care and outcomes: http://www.bmj.com/content/356/bmj.j84 . Usual provider of care index is a standard measure of continuity but some of the other measures of continuity cited as measures used “with no justification” (*eg,* reference 27, 35) are probably more salient in practices where patients are enrolled or attached to a primary care provider. Continuity is an important balancing measure to access and has been shown to be valued by patients (see: Turner D, Tarrant C, Windridge K, Bryan S, Boulton M, Freeman G, et al. Do patients value continuity of care in general practice? An investigation using stated preference discrete choice experiments. Journal of Health Services Research & Policy. 2007;12(3):132-7)	Our scope was restricted to studies that evaluated a primary care access management intervention. The broader topic about continuity as a measure of access was not in scope, but we appreciate the suggested literature provided and have incorporated them into our discussion of continuity.

Comment	Response
When discussing patient satisfaction as an outcome measures, it is important to note that **there is value in this measure regardless of its association with health outcomes**. Patient experience is one of the 3 points on the "triple aim" and improving patient satisfaction is a worthy goal in and of itself. There are, however, studies linking improved patient reported access with other outcomes. See: · Browne et al. "Measuring Patient Experience As A Strategy For Improving Primary Care" Health Affairs 2010 · van den Berg MJ, van Loenen T, Westert GP. Accessible and continuous primary care may help reduce rates of emergency department use. An international survey in 34 countries. Family practice. 2016;33(1):42-50 · Cowling TE, Cecil EV, Soljak MA, Lee JT, Millett C, Majeed A, et al. Access to primary care and visits to emergency departments in England: a cross-sectional, population-based study. PloS one. 2013;8(6):e66699. · Mian O, Pong R. Does better access to FPs decrease the likelihood of emergency department use? Results from the Primary Care Access Survey. Canadian Family Physician. 2012;58(11):e658-e66.	The value of patient satisfaction is an important point, we have now incorporated it into the discussion of patient satisfaction with the Browne and colleagues' article cited. However, our scope was to assess interventions to improve primary care access, and not patient satisfaction per se (which might encompass may different interventions). The other 3 articles (with first authors van den Berg, Cowling, and Mian) fall out of scope for the review since they do not describe interventions, primary care access metrics, or primary care access management tools.
The authors describe advanced access and the related components. Although advanced access is frequently viewed as a set of rules to improve scheduling, it is better understood as a philosophy of care that requires a paradigm shift beginning with physicians feeling accountable for the care of a panel of patients, not appointment slots. I think it's worth discussing this concept. Also, many misinterpret the "rules" in implementation and this is true of the NHS implementation where practices adopted policies of what Murray calls "access by denial" in lieu of doing the hard work of balancing supply and demand. I have discussed this previously in a related commentary I wrote which may be of interest: **Kiran** et al. Challenge of same-day access in primary care. Canadian Family Physician 2015.	We highlight the components of Advanced Access in response to the key question we were given, which focuses on key features of intervention. This is not to diminish the overarching model of Advanced/Open Access, and we have incorporated this point about the broader Advanced Access philosophy in the section where we describe the components.
The authors report the results of interventions on wait times and continuity. How about the result on emergency department use or chronic disease management? See: · Solberg LI, Maciosek MV, Sperl-Hillen JM, Crain AL, Engebretson KI, Asplin BR, et al. Does improved access to care affect utilization and costs for patients with chronic conditions? Am J Manag Care 2004;10(10):717-22. · Subramanian U, Ackermann RT, Brizendine EJ, Saha C, Rosenman MB, Willis DR, et al.Effect of advanced access scheduling on processes and intermediate outcomes of diabetes care and utilization. J Gen Intern Med 2009;24(3):327-33. Epub 2009 Jan 9.	We discussed relevant outcomes with our Technical Expert Panel, and as a result we focused on outcome measures that captured primary care access. While the impact of these interventions on emergency department use and disease management may be valuable impacts of such an intervention, these fall outside the scope of primary care access measures. Both these articles were identified in our searches, but we had excluded them since they did not include primary care access measures.
The article by Pope et al. does discuss unintended consequences related to patient experience. These outcomes could also be mentioned on page 23	Thank you, we now mention them as you suggest.
Here is an excellent Canadian on-line resource (from Ontario) that was missing from the list: https://machealth.ca/programs/advanced-access-efficiency-primary-care/	This has been added to the tools discussion.

APPENDIX D. EVIDENCE TABLE

Author, Year Title	Definition of Access	Evidence to support it	Sample of patients	Settings
Studies of interventions to improve access				
Radel, 2001[35] "Redesigning clinical office practices to improve performance levels in an individual practice association model HMO"	Wait time for an appointment	None	Patients of a not-for-profit HMO in New York	Two clinical office practices in Buffalo, New York, one site was suburban with 5 PCPs and the other site was a solo practitioner with 4,500 patients and 2.5 support staff
Kennedy, 2003[26] "Implementation of an open access scheduling system in a residency training program"	Utilization Patient satisfaction	None None	Patients of an academic family medicine practice	An academic family medicine practice seeing 24,000 visits annually with 3.3 faculty physicians FTE, 5.2 resident FTE, and 4.3 non-physician FTE
Meyers, 2003[30] "Changing business practices for appointing in military outpatient medical clinics: the case for a true "open access" appointment scheme for primary care"	Third next available appointment Continuity (% patients assigned a PCP who were seen by PCP)	None None	Military TRICARE patients attending a military family medicine clinic	A military family medicine clinic
Belardi, 2004[20] "A controlled trial of an advanced access appointment system in a residency family medicine center"	Third next available appointment Continuity (PCP-patient match, percentage of patient visits with patient-identified PCP)	None None	Patients of an academic family medicine clinic	An academic family medicine clinic in Pennsylvania
Solberg, 2004[42] "Key issues in transforming health care organizations for quality: the case of advanced access"	Third next available appointment	Using first available appointment is "erroneous"	About 240,000 patients of HealthPartners Medical Group	17 HealthPartners clinics in Minnesota
Armstrong, 2005[19] "Reinventing Veterans Health Administration: focus on primary care"	Mean number of days between date the appointment was fist requested and the date the appointment was actually	None	All VA primary care patients	Nationwide VA primary care clinics

Author, Year Title	Definition of Access	Evidence to support it	Sample of patients	Settings
	scheduled Third next available appointment	 None		
Schall, 2004[41] “Improving patient access to the Veterans Health Administration's primary care and specialty clinics”	Next available appointment	None	Veteran patients visiting a VA primary care clinic	VA primary care clinic in New York
Lukas, 2008[27] “The Implementation and Effectiveness of Advanced Clinic Access"	Next available appointment	None	Veterans patients visiting on of the included medical centers	Sample of 78 VA medical centers purposively sampled to capture high, medium, and low wait times
Parente, 2005[31] "A pre-post comparison of service operational efficiency and patient satisfaction under open access scheduling”	PCP access (Whether the patient saw their PCP during that appointment)	None	Patients of a pediatric practice	A four-clinician academic pediatric practice
Boushon, 2006[22] "Using a virtual breakthrough series collaborative to improve access in primary care."	Third next available appointment	Mention IHI	Patients at 17 organizations	17 organizations, no contextual description provided
Steinbauer, 2006[46] "Implementing open-access scheduling in an academic practice."	Third next available appointment	None	Patients at Baylor family medicine in Houston	Academic urban primary care practice
Sampson, 2008[40] "Impact of same-day appointments on patient satisfaction with general practice appointment systems Pickin, 2004[33] “Evaluation of advanced access in the national primary care collaborative”	Patient satisfaction with the appointment system	None	12,825 adult patients in English general practice	48 general practices in England

Author, Year Title	Definition of Access	Evidence to support it	Sample of patients	Settings
Windridge, 2004[44] "Problems with a 'target' approach to access in primary care: a qualitative study"				
Salisbury, 2007[38] "Impact of Advanced Access on access, workload, and continuity: controlled before-and-after and simulated-patient study."	Next available appointment Third next available Continuity of Care index Waits for particular MD	 "third available has been advocated because it avoids fluctuations due to short-notice cancellations" Citation for index None		
Dixon, 2006[23] "Advanced access: more than just GP waiting times?"	Third next available appointment	None	Patients at English general practices	462 English general practices
Goodall, 2006 [24] "Implementation of Advanced Access in general practice: postal survey of practices"				
Salisbury, 2007[37] "Does Advanced Access improve access to primary health care? Questionnaire survey of patients"				
Salisbury, 2007[39] "An evaluation of Advanced Access in general practice"	Third next available appointment Continuity (patient seeing doctor they ideally wanted to see)	None None	Data were collected by "secret shoppers" calling practices to get appointments	47 general practices in England
Pope, 2008[34] "Improving access to primary care: 8 case studies of introducing Advanced Access in England."	None	None	Patients at English general practices	8 general practices in England

Author, Year Title	Definition of Access	Evidence to support it	Sample of patients	Settings
Rohrer, 2007[36] "Impact of open-access scheduling on realized access"	Primary care visits for evaluation and management "Other primary visits for preventative care"	None None	1,410 family medicine patients classified as "chronic-stable" according to Adjusted Clinical Groups	Four Mayo clinics in different geographic locations
Mehrotra, 2008[29] "Implementing open-access scheduling of visits in primary care practices: a cautionary tale"	Third next available appointment time	"Thought to be more stable"	Patients of Partners Community Health Care, no other details given	Six practices participating in an advanced access initiative in Massachusetts
Bennett, 2009[21] "The effect of a carve-out advanced access scheduling system on no-show rates"	Third next available appointment No-show rate Continuity (proportion of appointments scheduled with PCP	Cites working paper from IHI None None	Patients of a family medicine clinic in South Carolina. 74 percent female, 68 percent black, 2 percent self-pay, 14 percent Medicaid, 47 percent aged 45-64 years	Academic urban family practice clinic seeing 30,000 visit/year. Staffed by 14 faculty MDs, 30 residents, 4 fellows, one nurse practitioner. Panel size = 100 patients/half day
Phan, 2009[32] "Decreased continuity in a residency clinic: a consequence of open access scheduling."	Continuity indices	Two previously used indices (Usual Provider Continuity Index and Modified Modified Continuity Index)	2,208 patients seen at Family Medical Center	Family Medicine Center in Phoenix with about 12,000 visits/year. Academic, urban site, with 32 physicians (24 residents, 8 faculty)
Tantau, 2009[43] "Accessing patient-centered care using the advanced access model."	Third next available appointment	"anchor metric for Advanced Access… more reliably reflects when the schedule actually has substantial capacity"	Patients of 2 organizations	Ministry Medical Group is multisite organization in Wisconsin with variability in site characteristics Providence Community Health Centers at Capitol Hill HC is in a urban setting in Rhode Island.
Cameron, 2010[45] "Adoption of open-access scheduling in an academic family practice	Third next available appointment Utilization No-show rate	Cites a working paper from IHI	Patients of 2 family medicine clinics in Halifax, Nova Scotia	2 family medicine clinics, one serving 20,000 patient visits/year and the other 10,000 patient visits/year
Tseng, 2015[47]	Third next available	None	OHSU Family Medicine Clinic (panel	Academic Family Medicine

Author, Year Title	Definition of Access	Evidence to support it	Sample of patients	Settings
"Implementation of Advanced Access in a Family Medicine Residency Practice"	appointment Patient continuity by team (Percentage of patients assigned to a PCP who had seen their PCP during the month) Press-Ganey satisfaction ("ease of scheduling appointments")	 None None	of 12,000 patients, "Spanning a wide range of ages and socioeconomic backgrounds")	Residency Program
Harris, 2015[25] "Impact of a quality improvement program on primary healthcare in Canada: A mixed-method evaluation"	Third next available appointment	None	Patients seeing providers that participated in the Quality Improvement and Innovation Partnership (QIIP). Patient demographics for both QIIP and control are provided for subgroups including those providing foot exam, A1c, and colorectal cancer screening data in Table 3 of the publication.	Family Health Teams and Community Health Centers in Ontario, Canada
MacCarthy, 2012[28] "Improving primary care in British Columbia, Canada: evaluation of a peer-to-peer continuing education program for family physicians"	Next available urgent appointment Next available regular appointment Third next available appointment	None	Patients of 157general practitioners and 109 medical office assistants who participated in the advanced access module of the intervention	Primary care practices in British Columbia, Canada
Studies about primary care access, but not hypothesis test of actual intervention				
Murray & Bewick, 2003[13]	None. This is a commentary about advanced access, with access classified only as "delays in care"			
Pierdon, 2004[15] "Implementing advanced access in a group practice network"	Third next available appointment	None	Geisinger Health System patients	Geisinger Health System clinics
Green, 2007[56] "Providing timely access to care:	Overflow frequency level (The fraction of days when	None	None. This is a modeling study.	

Author, Year Title	Definition of Access	Evidence to support it	Sample of patients	Settings
what is the right patient panel size?"	demand exceeds the average number of appointments available)			
NHS, 2009[53] "Improving Access, responding to patients: A how-to guide for GP practices"	"Good access" is about: -Patients being able to book an appointment quickly, within a reasonable time frame, and pre-book one if they wish -Patients being able to see a preferred clinician if they wish to wait longer for an appointment	None	None. This is a how-to guide	English National Health Source General Practitioners Practices
Balasubramanian, 2010[54] "Improving clinical access and continuity through physician panel redesign"	Wait time (until appointment with PCP) Continuity with PCP	None None	None. This is a mathematical modeling study that assesses how the composition of a panel can be organized to increase access	
Balasubramanian, 2013[55] "Dynamic allocation of same-day requests in multi-physician primary care practices in the presence of prescheduled appointments"	"Timely access" "Continuity of care"	"Two operational measures important for primary care"	None. This is a mathematical modeling study that assesses where in a normal workday pre-scheduled appointments influence access and continuity.	
Knight, 2013[12] "Appointments 101--how to shape a more effective appointment system."	Third next available appointment "Unmet demand" (a weekly tally of how many patients could not be given an appointment) "Patient satisfaction" ("I was able to make an appointment on the day I wanted with the clinician I wanted to see")	None None None	None. This is an article that "shares lessons from the Australia Primary Care Collaborative"	Primary care
Berry, 2014[8] "Toward a strategy of patient-	Patient-centered access is defined as "consistently	None	None. This is a commentary/how-to guide	None

Author, Year Title	Definition of Access	Evidence to support it	Sample of patients	Settings
centered access to primary care"	providing convenient access to services that patients need and desire"			
Donahue, 2015[18] "Tackling the Triple Aim in Primary Care Residencies: The I3 POP Collaborative"	Usual provider continuity (not otherwise defined) Third next available appointment	"The triple aim" "The triple aim"	300,000 patients in North Carolina, South Carolina, and Virginia; not otherwise described	27 primary care residents program

APPENDIX E. CITATIONS OF FULL-TEXT EXCLUDES

Not evaluations/Design

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Not about access

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Specific population

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No outcomes of interest

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Not an intervention

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workload in primary care: what is the optimal size of practices? A cross-sectional study. *Health Policy.* 2006;77(3):260-267.

Duplicate

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Not Available

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APPENDIX F. MEASUREMENT OF THIRD NEXT AVAILABLE

Author, Year Title	Description of Measurement
Solberg, 2004[42] "Key issues in transforming health care organizations for quality: the case of advanced access"	"Because the appointment data had originally been collected for individual physicians, data analysis required accounting for the full-time equivalent (FTE) status of each physician and nurse practitioner for adults and then calculating a mean access interval for each clinic for each month from June 1999 through August 2002."
Boushon, 2006[22] "Using a virtual breakthrough series collaborative to improve access in primary care."	"The main outcome measure for the VBTS, as for traditional BTS collaboratives working on reduction in waiting times, was the average number of days to third-next-available appointment."
Steinbauer, 2006[46] "Implementing open-access scheduling in an academic practice."	"We diligently tracked our backlog by measuring the time until the third available appointment for a brief visit and found that it varied from one provider to another in a range from 10 to 25 days."
NHS Salisbury, 2007[38] "Impact of Advanced Access on access, workload, and continuity: controlled before-and-after and simulated-patient study"	"In a 'simulated-patient' study, the researchers telephoned each practice once a month for 11 consecutive months to make an appointment with a doctor. Each attempt to contact the practice was on a randomly selected day of the week and within a randomly selected time slot. If the telephone was busy, diverted to an answer machine, and/or not answered within 2 minutes, up to 5 further calls were made during the time slot. Six attempts to contact each practice involved a request for an appointment with any doctor and 5 with a randomly selected named doctor. The time taken to make telephone contact and the wait for the first and the third available appointments were recorded (the third available appointment has been advocated as a better measure because it avoids fluctuations due to short-notice cancellations, but is more difficult to collect reliably). If the receptionist was not able to offer any appointments, offered alternatives were recorded." "Three measures of access to primary care services were used: time to third appointment (TTTA) with a GP; TTTA with a nurse; and percentage of patients seen on day of choice. The choice of TTTA as the measure of access is common to other evaluations of advanced access, and is justified on the basis that taking the 1st or 2nd available appointment is highly subject to random effect."
Dixon, 2006[23] "Advanced access: more than just GP waiting times?"	
Mehrotra, 2008[29] "Implementing open-access scheduling of visits in primary care practices: a cautionary tale"	"We calculated the 3rd available appointment measure for each practice based upon each provider's 3rd available time and weighted by the number of practice sessions the provider worked each week. In calculating the 3rd available appointment, we counted calendar days (*eg,* including weekends) and days off. Although part of open access implementation includes eliminating carve-out appointments (appointments which are closed to scheduling until they are made available for urgent visits the day of or the day prior to those visits), one practice retained these appointments, and we did not count them unless they had been released for booking. We also did not count appointments for providers on maternity leave or other extended absences, and those for temporary and urgent care providers. If providers were on vacation, they were included. All 3rd available measurements reported were collected at a consistent day and time (*ie* Mondays before the practices opened) and were collected by 3

Author, Year Title	Description of Measurement
	members of the open access implementation team either manually or via automated scheduling systems when available. Data checks were done to ensure the 3 study staff were collecting data in a comparable manner. During the implementation period we collected data on 3rd available appointment at least monthly. We trained practice staff to measure their own 3rd available times, and when practices began their own data collection or when no changes were being made within the practice, we collected data less frequently. We did not include 3rd available times collected by practices in our analyses."
Bennett, 2009[21] "The effect of a carve-out advanced access scheduling system on no-show rates"	"On the first working day of each month, each provider's schedule was checked, and their third-next available appointment for continuity appointments was recorded."
Cameron, 2010[45] "Adoption of open-access scheduling in an academic family practice	"This value was calculated approximately weekly for each physician in both practices and tabulated in a spreadsheet. The values for all physicians were averaged to determine the average clinic wait time by month."
Tseng, 2015[47] "Implementation of Advanced Access in a Family Medicine Residency Practice"	"The first measure we tracked was *third next available appointments* (Figure 1). Because this value changes constantly, we chose to run the report on the Monday morning of each week. The average third next available appointment represents the individual provider average rather than the team average. The median is reported in a similar way. We noted a difference between our average and median third next available, which reflects several individual providers with high third next available numbers."
Harris, 2015[25] "Impact of a quality improvement program on primary healthcare in Canada: A mixed-method evaluation"	"The survey included instructions for measuring the number of days until the third-next-available appointment, and a table to complete with the dates for the first, second, and third-next-available appointment (including date and time of measurement). To reduce the effect of seasonal changes on appointment variability, the surveys were sent once all physicians were recruited for the chart audit."
MacCarthy, 2012[28] "Improving primary care in British Columbia, Canada: evaluation of a peer-to-peer continuing education program for family physicians"	"… wait times (in days) on urgent, regular and third next available appointments, based on estimates given by all GP respondents"