Open-Access Scheduling

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Abstract

A variety of primary health care offices are looking for ways to reduce missed appointments, increase patient, provider, and staff satisfaction, decrease emergency room visits, and increase revenue. It is well known that patients miss their appointments for a variety of reasons and when patients cannot be seen when they want to be or need to be, they become less satisfied. They also begin to seek care in emergency rooms or urgent care centers, which unnecessarily increases healthcare spending and does not allow others to be seen. Additionally, when patients do not show up for their scheduled appointment, office income suffers. Therefore, the purpose of this paper is to propose an evidence-based practice project to determine how open-access scheduling (OAS) will affect missed appointments, patient satisfaction, provider satisfaction, staff satisfaction, revenue, and the use of emergency rooms or urgent cares in a primary health care setting. In doing this, it will address the overall problem, provide some background information on the topic, review internal and external evidence surrounding the problem, and will discuss the overall intervention and results from the proposed intervention.

Keywords: open-access, scheduling, emergency room or department, patient satisfaction, missed appointments, revenue.

Open-Access Scheduling

Health care providers are looking for ways to decrease missed appointments (MA), decrease emergency room visits, increase revenue, and increase patient, provider, and staff satisfaction scores in their primary care offices. Dating back to the 1990's, a physician, Dr. Mark Murray, and Catherine Tantau, a registered nurse, addressed an indirect solution to missed patient appointments by initiating open-access scheduling (OAS). With the goal of making patient care more easily available, implementing and evaluating this process took place in the year 2000 when they published their first study; which has now been recognized as a landmark piece of work (Grace, 2007). Their goal was to make patient care more easily available by "Do[ing] today's work today"(Grace, 2007), and their work has provided numerous benefits for providers.

Problem Statement

Missed appointments (MA) negatively impact the health care system and are best described as patients who do not show up or show up late for their scheduled appointment (Rosario, 2013). Multiple studies have found that MAs are a nation-wide problem and rates range anywhere from 3% to 80% (Kheirkhah, Feng, Travis, Tavakoli-Tabasi & Sharafkhaneh, 2015). A recent study has indicated that the average no-show rate is now 12.3% (Kuy, 2016). MAs decrease efficiency, increase worsening of chronic disease, decrease revenue, delay treatment, prevent other patients from being seen, wastes health care dollars, and wastes healthcare provider time (Kaplan-Lewis & Percac-Lima, 2013; Miller, Chae, Peterson, & Ko, 2015; Huang & Zuniga, 2012).

Additionally, providers have noticed a decrease in patient satisfaction scores and are looking for ways to solve the MA problem (Solberg, 2011). This is likely related to poor access

to healthcare when needed (Fournier, Heale & Rietze, 2012). In 2015, the Commonwealth Fund in Canada conducted a survey, and found only 41% of patients were able to see their provider on the same-day or the next day when they were seeking immediate medical attention (Kiran & O'Brien, 2015). Compounding the problem of MAs, Uscher-Pines, Pines, Kellermann, Gillen, and Mehrotra (2013) found that 39% of emergency room visits are non-urgent and could have been managed in the primary care office. This has benknown to increase health care spending and unnecessary testing, and provide unwarranted treatment (Uscher-Pines et al., 2013). Therefore, by finding ways to avert MAs, there is the possibility of decreasing emergency room or urgent care visits, increasing patient satisfaction scores and revenue in the primary care office, and decreasing overall healthcare expenditures. To solve this, they have found that OAS has been the solution to decreasing MAs. OAS allows an individual to make an appointment with their health care provider on the same day or the next day (Fournier, Rainville, Ingram, & Heale, 2015). Thus, these findings lead to the following clinically relevant PICOT question: In a primary care practice (P), how does open-access appointment scheduling (I) compared to traditional office scheduling (C) affect office income (outpatient revenue), patient satisfaction, provider satisfaction, staff satisfaction, emergency room or urgent care visits, and missed appointment rates (O) over three months (T)?

Background and Significance

Due to the many challenges associated with OAS, many health care offices have attempted other scheduling systems. Some have been proven more successful than others have and some are outdated while others are still being used to this day. These include scheduling reminder systems, over or double booking patients, penalization (Kheirkhah et al., 2015), or seeing patients on a first-come, first serve basis (Izard, 2005). Some of the common challenges

associated with OAS include difficulties with implementation, a physician shortage, provider resistance to changes in scheduling systems, frequent staff changes, and differing schedules among employees (Rose, Ross & Horwitz, 2011). Solberg (2011) discusses that due to the constant change in health care and how providers are being paid; OAS is being studied and reported quiet differently. Flaws in the design and reporting of published studies have been noted; and that is why many studies that are being published are observational or case studies (Solberg, 2011). According to Miller (2007), Dr. Murray believes only 20% of primary care practices are currently using OAS because implementation is challenging – and requires many changes and planning. Nonetheless, Murray & Tantau have provided various resources to practices to assist with implementing and facilitating this change (Solberg, 2011). Supporting the role of primary care is vital as it provides an important service to the public, is cost effective, and provides continuity of care to patients with acute and chronic conditions in order to reduce health disparities for all individuals (Agency for Healthcare Research and Quality, 2012). In 2010, there were close to 300,000 providers in the United States providing primary care including physicians, nurse practitioners and physician assistants (Agency for Healthcare Research and Quality, 2012).

Several reasons are cited for MAs. Kaplan-Lewis & Percac-Lima (2013) found that MAs are related to patients forgetting about their scheduled appointments or have received incorrect information about their appointment, as they may have received an incorrect date or time. In a survey conducted in the United Kingdom by Neal, Hussain-Fambles, Allgar, Lawlor, & Dempsey (2005) reasons were found as to why some individuals missed their appointments. These reasons ranged from difficulty with cancelling their appointment to being hospitalized (Neal, Hussain-Fambles, Allgar, Lawlor, & Dempsey, 2005). A study in Canada by Mitchell

(2008) found multiple benefits of using OAS. They not only noticed a decrease in no-show rates, but they found that patients were happier, physicians and staff felt more confident, and physicians noticed stability in their income. One study at Kaiser Permanente found that with using OAS, no-show rates decreased from 20% to 0% (Mitchell, 2008). DuMontier, Rindfleisch, Pruszynski, & Frey (2013) found that the longer the time lags between when an appointment is scheduled and when the appointment actually occurs, the less likely they are to show up for their appointment. Individuals who are underserved, have Medicaid, are Hispanic or African American, are known to have the highest rates of MAs (Kaplan-Lewis & Percac-Lima, 2013; Miller et al., 2015; & Homisak, 2013). It is also known that individuals who are uninsured are more likely to visit the emergency room for care that can easily be provided in a primary care office, causing undue health care costs (*Americans are visiting*, 2012; DuMontier et al., 2013).

Cost and lack of money are barriers to MAs. Kheirkhah et al. (2015) found that each missed appointment costs their practice $196. Moch (2012) found that adding one more patient to the schedule each day can help increase revenue vastly and that is why some physician practices charge patients a fee for missing their scheduled appointment. Fournier et al. (2012) found that a practice in Canada implemented OAS and saw their revenue increase by 7%. Additionally, Wojciechowski (2012) also found that OAS increased their revenue and allowed more units to be billed.

Additionally, when patients want to be seen for urgent matters on the same-day and cannot be seen by their primary care provider, they resort to going to clinics or emergency rooms (Fournier et al., 2012). Cox (2015) & Murray and Tantau (2000) found that greater patient satisfaction is achieved when patient's needs are met on the same day. Cox (2015) states that in order to keep up with the current millennial culture, much of appointment scheduling needs to

become more flexible and convenient for this population. A seminal report published by the New England Healthcare Institute (NEHI) in 2007 found that emergency departments in the U.S. currently waste $38 billion annually and one of the reasons health care costs are so high in emergency rooms is related to the lack of same day access availability in primary care (NEHI, 2010).

The current method for many primary care offices includes using the traditional method of scheduling, which allows patients to schedule future appointments (Rose et al., 2011). Currently at two primary health care clinics in Phoenix, Arizona, providers, medical assistants and other support staff list various reasons as to why patients do not show up for appointments. These include lack of transportation, lack of being able to see their preferred provider, lack of money/financial burden, symptom improvement, holidays, lack of babysitter/daycare services, location, forgetting about their appointment, or they are finding that their job and providing for their family is more of a priority than their health. They also believe having decreased access to care affects patient satisfaction. During one-week in June 2017, a survey was completed at the clinics asking patients who missed their scheduled appointments why they missed them. A total of 56 missed appointments occurred during this time frame, and 40 of them provided responses. The most common reasons included forgetting about their scheduled appointment or forgetting to call and cancel their scheduled appointment. Between the two health centers and 8 providers, from September 2016 to December 2016, 15.28% of patients missed their scheduled visits. During this time, and in the past, these clinics previously used automated system reminders and have called and reminded patients the day before to confirm their appointment without much success.

Search Strategy

An exhaustive search of the literature was completed on this topic. Six different databases were searched—ABI inform, Academic Search Premier, CINAHL, Cochrane Library, EconLit, and PubMed. The following are a list of the most common keywords that were searched among all six databases combined: *Open-access, scheduling, emergency room or department, patient satisfaction, missed appointments,* and *revenue.* Some terms were searched with a hyphen to yield additional results. MeSH, MAJR, MH terms included *appointments and schedules, health services accessibility/organization and administration,* and *cost-benefit analysis.*

Exclusion criteria included published dates before 2007, studies written in a non-English language or those that did not include humans. Ancestry searches led to studies published greater than ten years ago or studies that were not published; therefore, they were inappropriate for this review. Additionally, commentaries or editor reports were also excluded when looking at the literature for review since this information did not provide quality evidence.

Due to the lack of external information on the topic at hand, six databases were searched in depth over the last ten years. The following is a discussion on the databases yielding the most pertinent evidence to answer the PICOT question.

The Academic Search Premier database (Appendix B) provided an initial yield of 10,487 articles with the keywords *same day access* or *open access*. The final yield using *same day* or *open access* or *advanced access* and *appointments and scheduling* provided nine results, which were retained for further review. The Cochrane Library search strategy (Appendix D) provided an initial yield of 9,792 with the keywords *open access* or *open-access* or *advanced-access* or *advanced access* or *same-day* or *same day.* When the following key words were used, *appointments and schedules,* it provided an initial yield of 9,792. When both sets of these keywords were combined (*open access* or *open-access* or *advanced-access* or *advanced access*

or *same-day* or *same day* and *appointments and schedules*), final yields of 26 articles were found and retained for further review. The EconLit search strategy (Appendix E) provided an initial yield of 368 articles with the keywords, *open access* or *same day access* or *open-access* or *same-day access.* When the keywords, *appointments and scheduling* were added, it provided an initial yield of 30 results. When these sets of key words were combined (*open access* or *open-access* or *advanced-access* or *advanced access* or *same-day* or *same day* and *appointments and schedules*), it provided a final yield of one result.

After critical appraisal of 57 studies, ten have been chosen for inclusion in this literature review (Appendix A, B, C, D, E, F). Those that were included evaluated effects of patient satisfaction, outpatient revenue (income), MAs and emergency room or urgent care visits with the use of OAS.

Critical Appraisal and Synthesis of Evidence

Ten studies, as presented in Appendix G, were retained for inclusion in this review, following a rapid critical appraisal process. The final ten studies included: (1) prospective and retrospective (PR) quantitative study; (1) PR quantitative cohort study; (1) cross sectional retrospective study (CSS); (1) anecdotal observations and experience study; (1) discussion, (1) survey; (1) comparison study with the use of variables; (1) systematic review (SR) of meta-analyses (MTA) in a qualitative study; (1) case study (CS); and (1) multi-level regression model. Three of these studies were level VI evidence, two studies were a level IV, three studies were a level VII, one study was a level V, and another study was a level III. These studies were rated according to the hierarchy of evidence described by Fineout-Overholt (2009). The overall levels of evidence for these studies are considered low; however, these studies were the best available evidence based on the inclusion criteria and the PICOT question.

Due to the limited availability of evidence on OAS, difficulties associated with implementing OAS, and predominant numbers of longitudinal studies, the strength of the evidence is difficult to determine. Therefore, the goal of this project is to look at appointments and schedules in primary care offices, and look for ways to 'improve the process' by implementing OAS so that MAs do not occur, patient satisfaction is achieved, revenue is increased, and emergency room visits decrease. Most of the studies reported no conflicts or bias (Appendix G); however, one study, which was a systematic review of meta-analyses, did discuss some bias (Appendix G). Depending on the bias that is reported, it is likely to weaken the body of the evidence.

There was moderate homogeneity across the studies. Nine of the studies used OAS as their intervention (Appendix G & H) and seven of the studies examined the effects of MAs with the use of this intervention (Appendix G & H). Very few studies looked at patient satisfaction (3), revenue and cost (3), and emergency room visits (1) (Appendix G & H). Many differences exist in regards to the study design, as there are not any studies that have the same exact design; which ultimately affects proposing the best intervention for the project (Appendix H). One study looked specifically at lead time (which looks at the time difference between when an appointment is made to when the appointment is scheduled) and found that when appointments are made closer to the date of the appointment then they are more likely to show up for their appointment (Appendix G). Additionally, the majority of the studies were done in the United States or Canada, making this process likely feasible in the United States (Appendix G). Some heterogeneity exists among these studies as well as the interventions of OAS were implemented in a variety of settings including primary care, physical therapy/occupational therapy, an

ophthalmology clinic, and veteran clinics (Appendix G). Similarly, one study used model formulations to determine the effects of OAS on MAs (Appendix G).

For the majority of the studies, the independent variable included a form of OAS (Appendix H). The dependent variables varied among the studies, but the majority discussed MAs (Appendix H). Other dependent variables included patient satisfaction (3), emergency room visits (1), revenue or costs (3), wait time (4), and lead time (1) (Appendix H). A variety of tools and measurements were used among the studies. One study used time to third appointment available where empirical data was collected overtime and with the use of *t* tests, and found a statistically significant reduction in MAs ($P<0.0001$) (Appendix G). Another study interviewed clinical staff and used open-ended surveys to determine if a multi-method intervention including OAS would reduce MAs. Chi-squared tests were used to determine the no-show rate and found a significant reduction in the number of MAs in the total patient population ($P<0.001$) in the office and in the individuals that miss appointments the most ($P<0.001$) (Appendix G). One study looked at patient satisfaction through observations and statements or comments made by the patients, providers and staff. No source of data analysis was used; however through these observations and statements, they found patients were more satisfied with this method as more than 85% of patients were able to schedule appointments on the same day or the next day and were also able to reduce office costs (Appendix G). Another study obtained data from a computerized scheduling database and examined the correlation between keeping appointments when an appointment is made closer to the actual appointment date. Z-tests were used to determine this comparison and found that faculty physicians and resident physicians, had a significant reduction in MAs ($P<0.001$). They also found that when patient's appointments are scheduled more than two weeks from their scheduled appointment, they are more likely to miss it

(Appendix G). In another study, the office scheduling system was used to determine the rates of MAs and a survey was sent out to 100 randomly selected patients at the office to determine their satisfaction with the new system. The data analysis they used to report their findings was not reported; however, found that their patients were more satisfied (93%), as were the physicians, and they noticed a reduction in MAs (Appendix G).

One study used a scheduling manager, and their military health system management analysis and reporting tool along with an army provider level satisfaction survey to determine patient satisfaction with patients in an army setting. A panel time series analysis with general estimating equations was used to analyze the data, which concluded that patients were more satisfied with OAS (Appendix G). Similarly, another study used a nonlinear integer program with model formulations using equations to determine whether the OAS system is preferred over the traditional scheduling system in reducing MAs by using marginal analyses (Appendix G). One study performed a systematic review of meta-analyses regarding all the literature out there about OAS and their findings, and found that in the majority of studies done, open-access does reduce the number of MAs (Appendix G). The measurement tool(s) and data analysis used was not discussed in depth for any of the studies in this review (Appendix G). Additionally, one study used the Pittsburgh Veteran Engineering Resource Center and Office of Systems Redesign Group, a scheduling system to determine the number of missed appointments in their office where they provided physical and occupational therapy for patients (Appendix G). The data analysis they used was not reported; however, their findings found that the number of missed appointments reduced significantly with the implementation of OAS as it went from 20% to 10% and they found that their office revenue increased as well (Appendix G). Lastly, another study used the area resource file, the Charlson Index, and the Deyo-Quann approach to determine

whether OAS reduces emergency room visits (Appendix G). They used a one-way ANOVA to analyze their findings and found that when access to primary care is improved, it can reduce emergency room visits for non-emergent and primary care treatable events (Appendix G). Thus, it can be concluded that not all of the studies have one instrument or tool, or analysis tool that works best when determining the benefits of OAS. Nonetheless, all of these studies support the PICO question.

Conclusion

Implementation of OAS has provided many benefits for primary care offices. It has been shown to decrease MAs, increase patient satisfaction, increase revenue, and decrease emergency room and/or urgent care use (Appendix H). Additionally, one study found that when appointments are made closer to the actual appointment time, they are more likely to show up for their appointment (Appendix G). Thus, literature indicates with OAS, patients are more satisfied, an increase in revenue is seen and fewer patients seek emergency room care for non-emergent care; all of which yield more positive effects in scheduling compared to the traditional method (Appendix I).

Purpose and Rationale

Since MAs cause negative health care outcomes, interventions aimed at improving MA rates are needed. Implementation of an OAS system has shown to increase patient satisfaction, decrease MAs, decrease office costs, and decrease emergency room and/or urgent care visits in primary care offices (Agency for Healthcare Research and Quality, 2015; Institute for Healthcare Improvement, n.d.). The purpose of this paper is to review and critically appraise the literature surrounding the effects of OAS on MAs, revenue, patient satisfaction, and emergency room and/or urgent care visits.

Contribution of Theory

The chosen theoretical framework is the theory of planned behavior (Appendix I). This framework allows one to believe a certain behavior change will provide certain outcomes through subjective evaluation of the risks and benefits associated with that outcome (Boston University, 2016). In this case, the benefits, challenges, and risks associated with the implementation of OAS were evaluated and found that much of the evidence is subjective through pilot or case studies (Boston University, 2016). In order for a behavioral change to occur, motivation and the ability to change are needed to make the change (Boston University, 2016). This theory has six different elements: 1) attitude, 2) behavioral intention, 3) subjective norms, 4) social norms, 5) perceived power, and 6) perceived behavioral control (Boston University, 2016) (Appendix I). Overall, these elements look at whether individual are in favor or not of the projected change, and the motivation of individuals (Boston University, 2016). This framework evaluates whether or not people approve of what is coming, how the group at large feels about the change versus individually, certain factors that may hinder the change, and looking at each person's perception regarding the difficulty or ease that may be associated with the project change (Boston University, 2016). All of these elements are important when trying to implement something new that requires all members of the team to be on board in order for it to be successful (Boston University, 2016). Additionally, the behaviors of the individuals must be evaluated in trying to understand reasons for MAs and decreased patient satisfaction, which can help us better understand why there are more emergency room visits and decreased revenue.

EBP Model

The Ottawa Model of Research was the chosen model to guide the development of a potential evidence based practice project. This theory provides a specific process that lends itself

to effectively implement a new process in a system. The first step involves assessing the barriers and support available; therefore, one must understand the current barriers that exist and why there is a need to implement a certain change and then one must determine if there is adequate support to implement the process (Sudsawad, 2016). Then the interventions must be monitored before one is able to evaluate the outcomes of the intervention. This model has six key elements: 1) evidence-based innovation, 2) potential adopters; 3) the practice environment; 4) implementation of interventions; 5) adoption of the innovation; 6) outcomes resulting from implementation of the innovation (Sudsawad, 2016). (Appendix J). Primarily, one must find a need, determine what change needs to occur in a setting, and if evaluate internal and external evidence on the problem or need (Sudsawad, 2016). Then, internal evidence must be found through stakeholders, employees, staff, etc. and data must be gathered regarding attitudes, concerns, knowledge, etc. currently exists within the facility, and current and former practice changes that have occurred (Sudsawad, 2016). Then other factors that may contribute to the practice change must occur by looking at the culture, patients, structure, finances, etc. (Sudsawad, 2016). Then one is able to determine ways to effectively implement the strategy, adopt it and then find the outcomes of the study (Sudsawad, 2016). Initially, a need at a primary care clinic in Southwestern United States was identified and internal data regarding the matter was gathered. Then an exhaustive search of the literature was completed in regards to OAS so that the intervention may be implemented effectively based on the data that currently exists and so that statistically significant data can be found. This model was chosen specifically for this project as it has been known to be highly effective and highly feasible in multiple studies and guides many evidence-based practice models (Sudsawad, 2016).

Project Methods

Ethics

There were no known or foreseeable risks or discomforts related to participation in the project other than those that are associated with everyday types of activity. Completion of the survey was voluntary with minimal time required (approximately five minutes). Responses to the survey remained confidential and were identified only by a number that was not be connected by a name or any other personal identifying information. The pre-assigned ID number on the questionnaire was the same number on the survey for each participant. The ID numbers were not linked or coded to any other data sources or participants in any way. The data was only shared with the clinics, any patients who wished to receive project results, and for project dissemination. If the patient, provider or staff member was unwilling to participate, there was no harm or penalty, and they were not treated any differently as a patient, provider, or staff member by the clinic/facility.

Setting, Culture, Leadership, & Participants

The project was completed at two federally qualified health centers in Phoenix, Arizona. These facilities primarily care for the Hispanic population providing primary care, preventative services, family planning, obstetric care and a variety of other services. The project consisted of surveying patients that were being cared for at the clinic and also providers and staff. Providers were either physicians or nurse practitioners, and staff members were medical assistants, lab technicians, promoters, medical assistant supervisors, or front desk staff. Leadership team that was involved with assistance of gathering data or implementation of the project included the chief medical officers, chief administrative officer, and the chief financial officer.

Team Collaboration

Prior to implementation of the project, meetings with the assistant medical officer and the chief administrative officer were held discussing the problem, and the best scheduling method to implement at the facility given internal and external evidence available. Thereafter, an educational session was held discussing the issue and training regarding what to expect was also provided to the providers and staff at both clinics. The training included an educational information session reviewing what OAS is and discussing the positive effects OAS can have on patient satisfaction, revenue, MAs, and emergency room and/or urgent care use.

Intervention

Due to the lack of external information available on this topic, six databases were searched in depth from 2006-2016 discussing OAS. As a result, after reviewing and analyzing findings found in literature, an OAS method was implemented at both facilities beginning in September 2017. One provider at each clinic in the afternoons (from 1300-1600) did not have any pre-scheduled patients. Patients that were scheduled for these days were only allowed to make an appointment the same-day or the day before. These providers also accepted same-day walk-ins. The surveys were given only to patients who benefited from using the new scheduling system, and were voluntary. Surveys were also provided to all providers and staff members at the clinic, and were voluntary for them as well.

Outcome Measures, Data Collection, Analysis Plan, and Proposed Budget

Patient satisfaction, provider satisfaction and staff satisfaction was measured using a five-point Likert scale (Brown, 2010) to determine satisfaction with the new vs. the old scheduling system. The likelihood of using an emergency room or urgent care was measured using a dichotomous scale. In order to determine revenue gain or loss, the electronic medical record (EMR) system, eClinicalWorks provided us with total revenue for any time frame that was

needed. The revenue from September 2016 to December 2016 was compared to the revenue from September 2017 to December 2017. Missed appointments were measured using a data collection plan/chart audit as well. In order to determine the number of missed appointments, the Institute for Healthcare Improvement (2017) recommends using a data collection plan by calculating the number of missed appointments in a month (numerator) and dividing it by the total number of scheduled appointments in a month (denominator). Then when you multiply this number by 100, you will receive a percentage; which will give you the total number of missed appointments. However, this will need to be compared to a time frame prior to implementation in order to determine the effect of OAS on missed appointments.

A dichotomous scale has shown to have only high levels of reliability without much mention to levels of high validity (Byrne, Allen, Dove, Watt, & Nathan, 2008); however, the likert scale has been known to have high levels of validity and reliability, especially when a five-point scale is used like it was in this project compared to the four-point scale (Osteras, Gulbrandsen, Garratt, Benth, Dahl, Natvig, & Brage, 2008). Although both of these scales were used, they were adapted to suit the purpose of this project since there was a lack of data/information/tools available for use with reliability and validity available to related to this intervention. Missed appointments were measured using a chart audit. Chart audits are commonly used and help us by providing information on office systems (Agency for Healthcare Research and Quality, 2013a). Chart audits also allow us to collect, analyze and report data in an attempt to improve quality and performance (Agency for Healthcare Research and Quality, 2013b).

For the patients, providers and staff, a survey was provided to them asking them non-identifiable demographic data. The patients were asked to discuss their satisfaction with the old

scheduling system compared to the new scheduling system (These questions were asked using the five-point Likert scale). They were also asked to discuss their likelihood of visiting an emergency room or urgent care, given that they were able to make an appointment to see a provider on the same day or the next day (This question was asked using the dichotomous scale). Providers and staff were asked to discuss their satisfaction with the old scheduling system compared to the new scheduling system as well. Additionally, for data collection, a chart audit was used to compile data found in the charts regarding missed appointments during the time of implementation and one-year prior during the same time frame. The same way, revenue was measured, through comparison of income made after the implementation of the project and compared to the year prior during the same time frame.

In order to measure patient, provider, and staff satisfaction, the Wilcoxon test was used. Findings regarding missed appointment rates and revenue were also evaluated through pre/post comparisons. Similarly, a percentage was provided discussing the likelihood of patients using emergency room or urgent care services given that they were able to see a provider on the same day. The overall proposed budget for this project was $4,161.79.

Outcomes/Project Results/Impact

Patients

A total of 58 patients with or without dependents completed the demographic and/or satisfaction survey. The average age of the patient was 39.73 years (13.88). The number of years ranged from 20 to 70. The average age of the dependent was 16.78 years (19.17), and the number of years ranged from 1 to 53. The majority of the patients were female (71%, n=42), while the others were male (22%, n=13), and the remaining did not include their gender. Majority of the patients were also Hispanic (80%, n=47), and did not have insurance (64%, n=38), and were

established patients at the facility (71%, n-42). Additionally, the majority of the patients also reported that they have never missed or forgotten to cancel their scheduled appointment (66%, n=39). Demographic data on the dependents was also gathered and found that the majority of the dependents were of male gender (9%, n=5), were Hispanic (15%, n=9), did not have insurance (7%, n=4), were an established patient (15%, n=9), and reported that they did not miss a scheduled appointment in the past (15%, n=9). Prior to the new scheduling change, 36 (72%) of the patients reported being very satisfied or extremely satisfied with the old scheduling system, and 52 (96%) of the patients reported being very satisfied or extremely satisfied with the new scheduling system). Similarly, nine (18%) of the patients reported being either not at all or slightly satisfied with the old scheduling system; where as none of the patients reported being not at all or slightly satisfied with the new scheduling system.

Providers

A total of seven providers completed the demographic and/or satisfaction portion of the survey. The providers were all females. The sample consisted of 5 (71%) Caucasian and 2 (29%) Hispanic providers. The provider specialty consists of 6 (86%) providers specializing in family care and 1 (14%) in adult-geriatrics. The sample consisted of 4 (57%) nurse practitioners, and 2 (29%) physicians. The average number of years of provider experience is 2.21 (1.35). The number of years ranges from 1 to 4 years. The average length of time for each provider at the clinic is 1.70 (1.40) years. The number of years ranged from two months to four years. Prior to the new scheduling change, 2 (34%) the providers reported being either slightly satisfied or very satisfied with the old scheduling system. Four (67%) of the providers reported being moderately satisfied with the old scheduling system (three of them were nurse practitioners, and one of them was a physician). None reported being extremely satisfied or not at all satisfied. Similarly, none

of the providers reported being not at all or slightly satisfied with the new scheduling system. In fact, 6 (86%) of the providers reported being either very satisfied or extremely satisfied with the new scheduling system. The number of years of experience and the number of years at the facility did not make a difference. One (14%) reported being moderately satisfied with the new scheduling system. The providers that had 1 year of experience or less were moderately satisfied or very satisfied (3) with the old scheduling system. However, with implementation of the new scheduling system they were very satisfied (3). The providers (1) with 2 years of experience were slightly satisfied with the old scheduling system, and were extremely satisfied with new scheduling system (1). The providers with 4 years of experience were moderately satisfied (1), and were very satisfied (2) with the old scheduling system.

Staff

A total of 14 staff members completed the demographic and/or satisfaction portion of the survey. The staff members were all Hispanic females. The majority of the staff members reported that they either always (43%) or sometimes (43%) schedule patients for appointments. Only 2 (14%) staff members reported that they never schedule patient appointments. The majority of the staff members were either medical assistants (36%) or front office schedulers (36%). The remaining staff members were medical assistant supervisors, medical assistant and promotors, or a medical assistant and lab technician (29%). Majority of the staff had about 1 year of experience (29%), and 2 (14%) of the staff members had eight years of experience in their role, and both of these individuals also reported that they were not at all satisfied with the old scheduling system. The years of experience at the facility had similar results to overall number of years of experience. Each of these members reported that they were moderately satisfied or very satisfied with the new scheduling system. The individuals with 9 years and 10 years of

experience both reported being extremely satisfied with the new scheduling system, and also reported being not at all satisfied with the old scheduling system. None of the staff members reported that they were very or extremely satisfied with the old scheduling system; however, 10 (71%) of the staff members reported either being very or extremely satisfied with the new scheduling system, (43% of these individuals were either medical assistants or front office schedulers).

Statistical/Clinical Significance

Patients

When analyzing results, a Wilcoxon test was conducted to examine whether patients were more satisfied with the old scheduling system or the new scheduling system. The results indicated a significant increase in patient satisfaction, z=-3.49, P<.01. The mean of the ranks in favor of satisfaction of the old scheduling system was 3.87 (1.42), while the mean of the ranks in favor of the new scheduling system was 4.63 (.56) on a scale of 1-5.

Providers

A Wilcoxon test was conducted to examine whether providers were more satisfied with the old scheduling system or the new scheduling system. The results indicated a significant increase in provider satisfaction, z=-1.89, P= .06 (P<0.10) The mean of the ranks in favor of satisfaction of the old scheduling system was 3 (.63), while the mean of the ranks in favor of the new scheduling system was 4 (.58) on a scale of 1-5.

Staff

A Wilcoxon test was conducted to examine whether staff were more satisfied with the old scheduling system or the new scheduling system. The results indicated a significant increase in staff satisfaction, z=-2.852, P= .004 (P<.005) The mean of the ranks in favor of satisfaction of

the old scheduling system was 2 (.88), while the mean of the ranks in favor of the new scheduling system was 3.79 (.98) on a scale of 1-5.

Missed Appointments

Overall the MA rate did decrease, which indicated clinical significance, but was not statistically significant. From September 2016 to December 2016, the MA rate was 15.28%. During this three-month period, a total of 4,314 patients were seen at the two clinics among eight different providers. In September 2017 to December 2017, the MA rate was 14.76%. During this three-month period, a total of 5,191 patients were seen at the two clinics among eight different providers. Overall, 877 more patients were seen over a three-month period, and findings resulted in a 0.52% decrease in missed appointment rates.

Revenue

When comparing the three months, in 2016 to 2017, a 41% increase in revenue was noted during the implementation period of this project.

Emergency Room/Urgent Care Visits

When patients were asked about the likelihood of using an emergency room or urgent care, 88% (N=37) and 90% (N=38) reported that they were less likely to use these services given that they were able to see a provider on the same day with the implementation of this project, respectively.

Discussion

Overall, the patient, provider, and staff satisfaction results indicated statistically significant values indicating that they were more satisfied with the new scheduling system, which allowed patients the option to make an appointment and see a provider on the same day or the next day. This new scheduling system is known as OAS. Similarly, results also indicated

clinically significant results in regards to patients being less likely to visit the emergency room or urgent care, given they were able to see a provider on the same day. After implementation of this study, an outcome that was not measured, but proven to be clinically significant was that the facility saw 877 more patients during the three-month period when this project was being implemented. Multiple factors also hindered this factor, but surprisingly did not limit the results. For example, in September 2017, the facility moved from seeing patients every 15 minutes to every 20 minutes. This meant that they went from seeing a maximum of 12 patients in the afternoons to 9 patients. Similarly, other factors also played a role in possibly decreasing the number of patients that scheduled appointments or missed their appointment time such as certain laws that were passed, and other political environmental limitations. On the contrary, we know that this did not impact the facilities negatively, as it provided a clinically significant increase in revenue, and a clinically significant decrease in missed appointments. Other factors that may have limited results included a language barrier in filling out the surveys, even though the patient surveys were translated and provided to patients in both languages, English and Spanish. Similarly, not having a valid or reliable measurable instrument or tool could have also hindered overall findings of the project. Furthermore, the chief financial officer (CFO) at the facility does not believe the revenue results to be fully accurate. In July of 2016 (data was compared starting in September 2016), the organization went from an old electronic medical record to a new electronic medical record system, and as a result of this change, the CFO believes that the providers were not billing appropriately. However, after speaking to some of the providers at the facilities, they do not believe that to be fully accurate, and many report they did bill appropriately, even during the transition of the new scheduling system. Nonetheless, if they did not bill appropriately, the increase in revenue most likely did increase since more patients were

seen during the time frame of the project, and no decreases in the number of missed appointments were noted.

Alternatively, the minimal exclusion criteria (that was not based on a specific diagnosis, chronic condition, age, etc.) led to a larger sample size. All patients who were impacted by the new scheduling system were provided the opportunity to fill out the survey, which resulted in a diverse group of individuals who provided their feedback regarding the scheduling system. Similarly, the short questionnaire and survey most likely inclined more individuals to participate, and gathering of data required minimal time. Statistically significant results were also noted over a short period of time, which provided to be the greatest benefit especially since OAS was not fully implemented clinic-wide. In fact, it only involved one provider at each clinic, and only in the afternoons, leaving at least six providers available for other scheduled appointments, and leaving the same-day providers available for scheduled appointments in the morning.

This project can be implemented in any practice setting that requires patients to be seen for acute matters, primarily in primary care settings. The lack of literature indicates that difficulties exist in implementation of this project; however, the positive findings discussed above should provide one with relief and motivation for implementation into their practice, especially if missed appointments are negatively impacting the workplace.

Conclusion

Although further work is required regarding this type of scheduling system, implementation of OAS has provided many benefits for primary care offices, and has shown to be transferrable in any setting. This type of scheduling system has great potential in increasing revenue and seeing more patients. It has also shown to increase patient, provider, and staff satisfaction whilst potentially decreasing urgent care and emergency room visits. Furthermore, it

has shown to decrease rates of missed appointments as well. Thus, given the wide-range of positive effects OAS has shown in this project, implementation is highly recommended.

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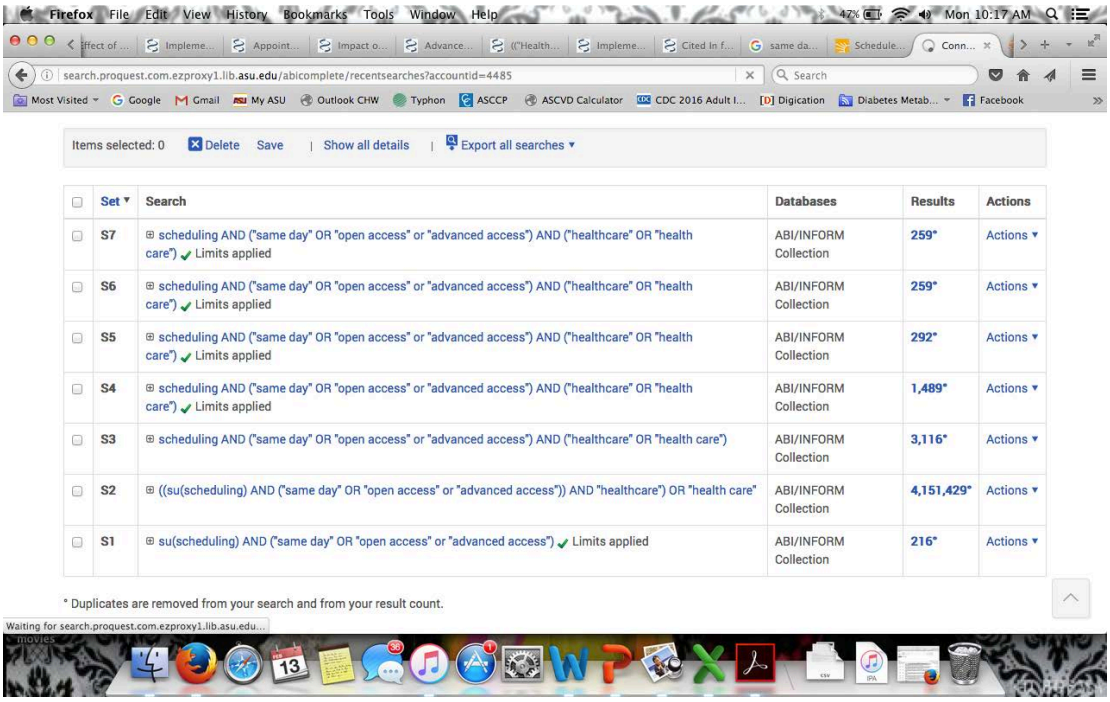
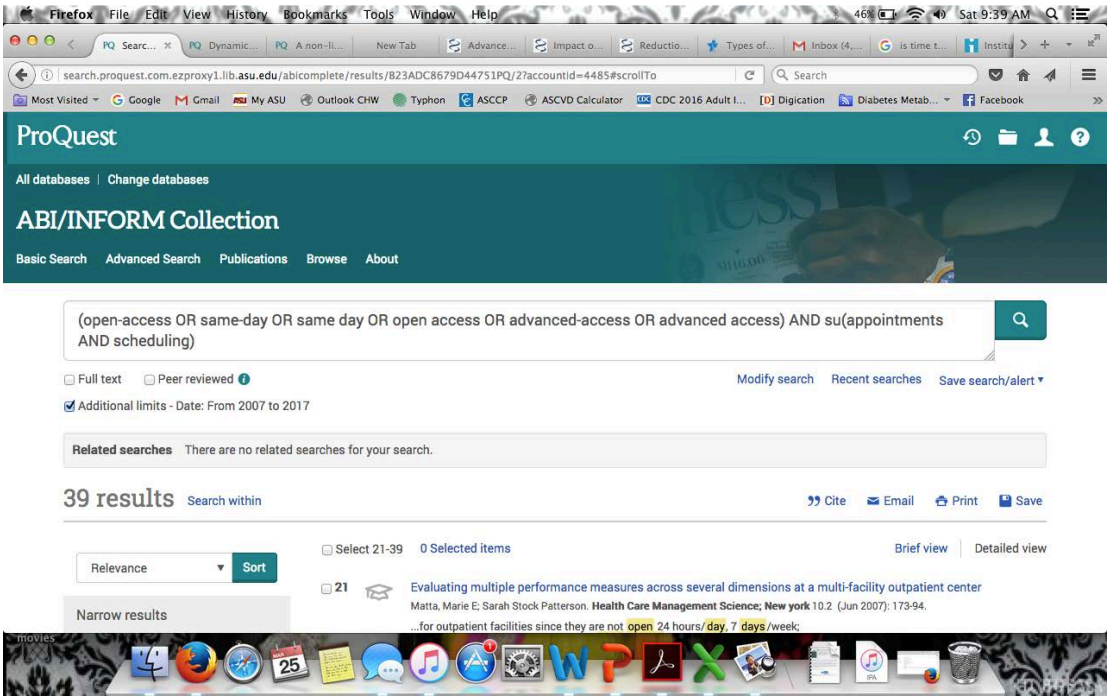
Appendix A

Search Strategy 1

ABI/Inform

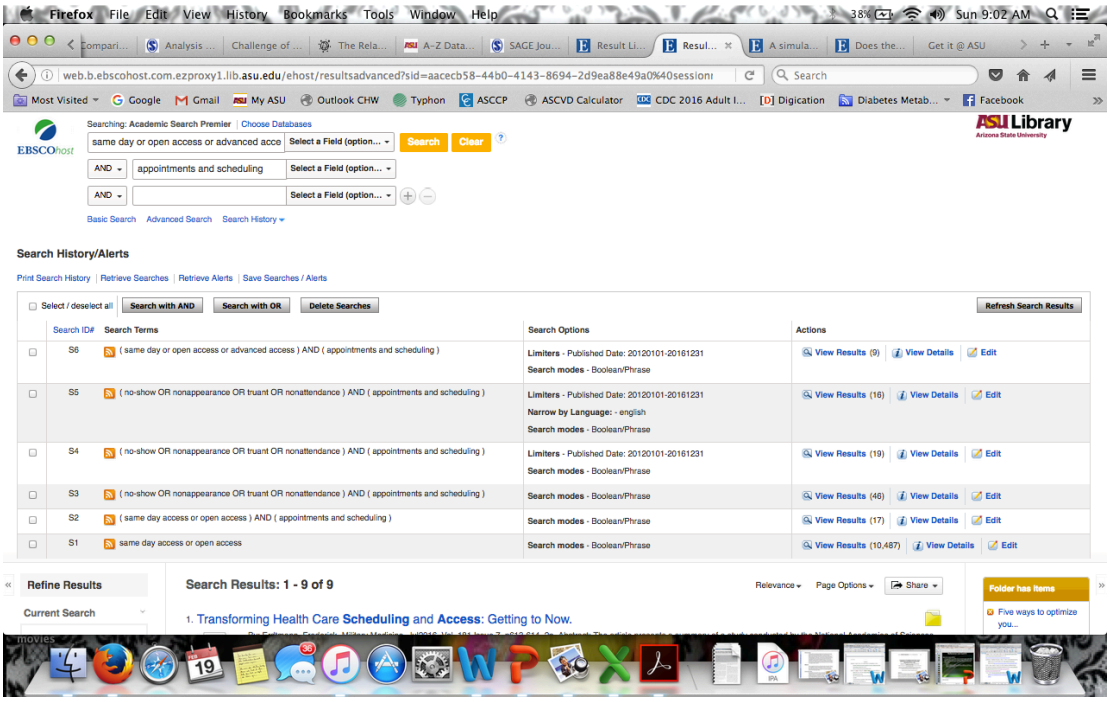




Appendix B

Search Strategy 2

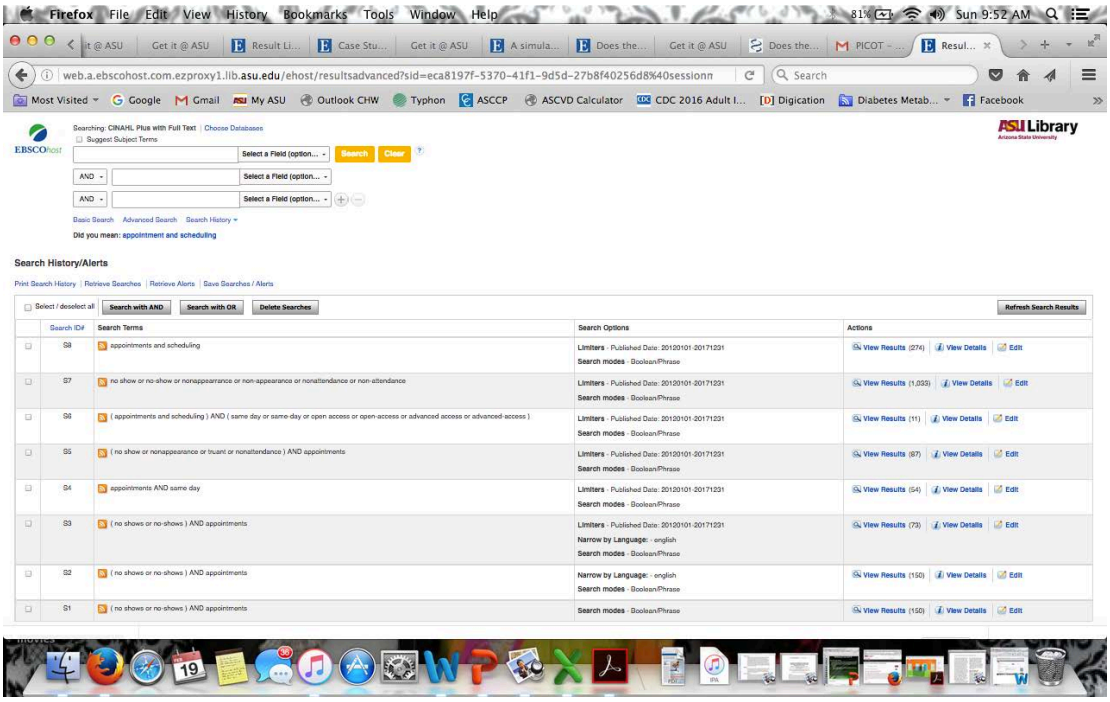
Academic Search Premier

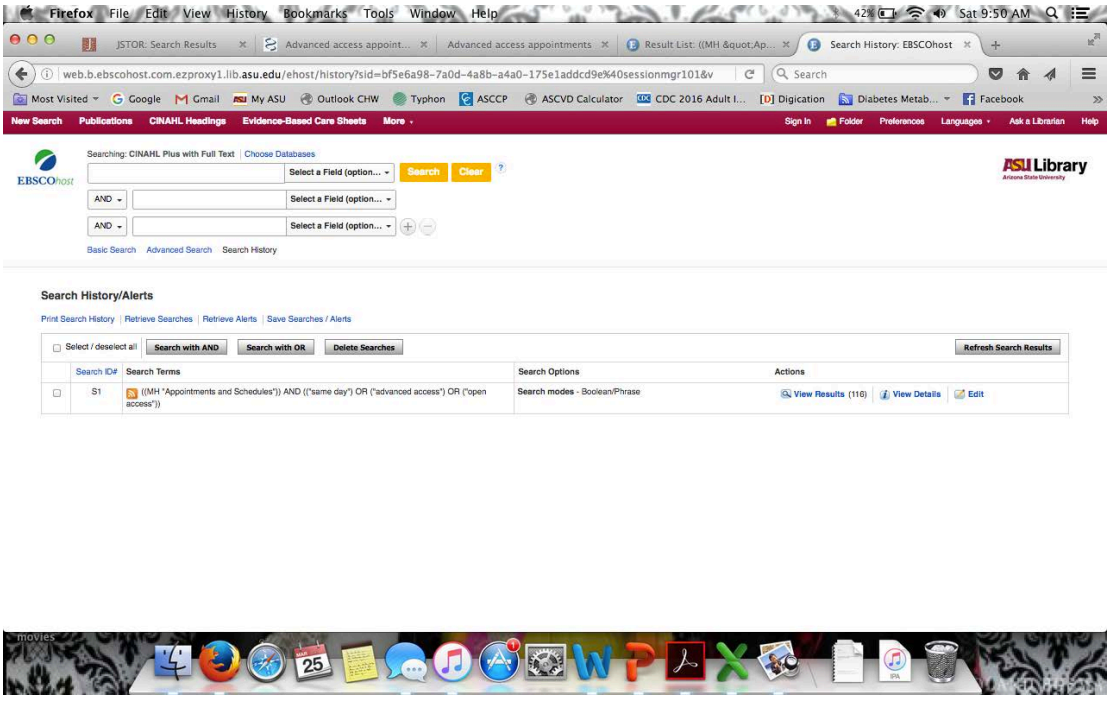


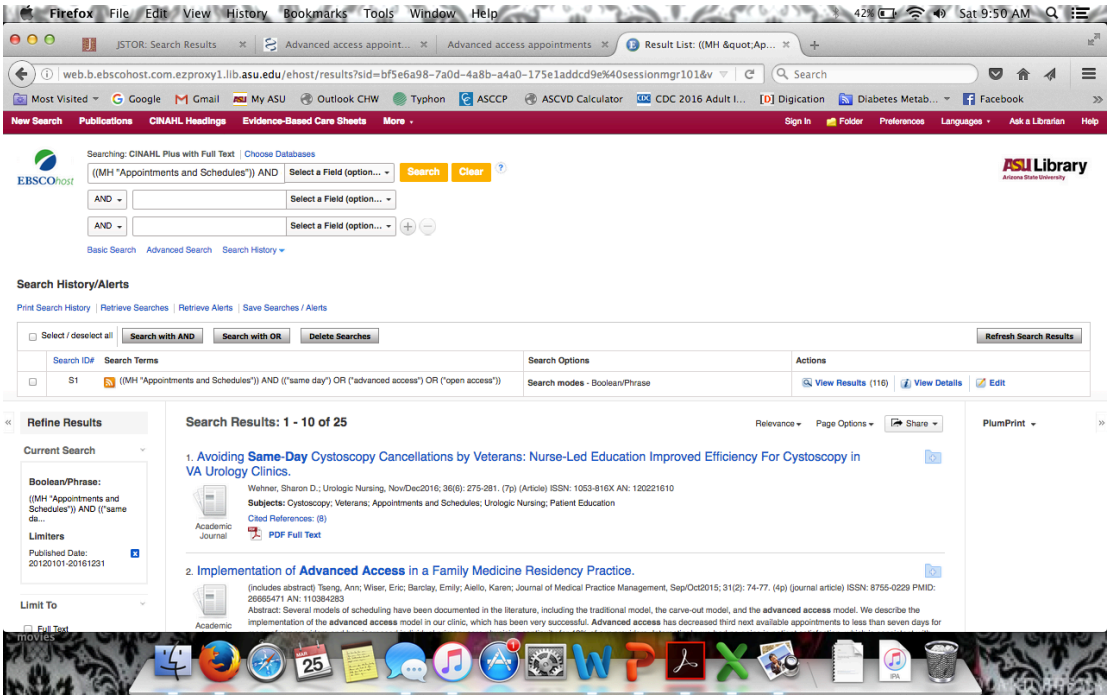
Appendix C

Search Strategy 3

CINAHL



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1. Avoiding Same-Day Cystoscopy Cancellations by Veterans: Nurse-Led Education Improved Efficiency For Cystoscopy in VA Urology Clinics.
Wehner, Sharon D.; Urologic Nursing, Nov/Dec2016; 36(6): 275-281. (7p) (Article) ISSN: 1053-816X AN: 120221610
Subjects: Cystoscopy; Veterans; Appointments and Schedules; Urologic Nursing; Patient Education
Academic Journal
Cited References: (8)
PDF Full Text
2. Implementation of Advanced Access in a Family Medicine Residency Practice.
(includes abstract) Tseng, Ann; Wiser, Eric; Barclay, Emily; Aiello, Karen; Journal of Medical Practice Management, Sep/Oct2015; 31(2): 74-77. (4p) (journal article) ISSN: 8755-0229 PMID: 26665471 AN: 110384283
Abstract: Several models of scheduling have been documented in the literature, including the traditional model, the carve-out model, and the advanced access model. We describe the implementation of the advanced access model in our clinic, which has been very successful. Advanced access has decreased third next available appointments to less than seven days for
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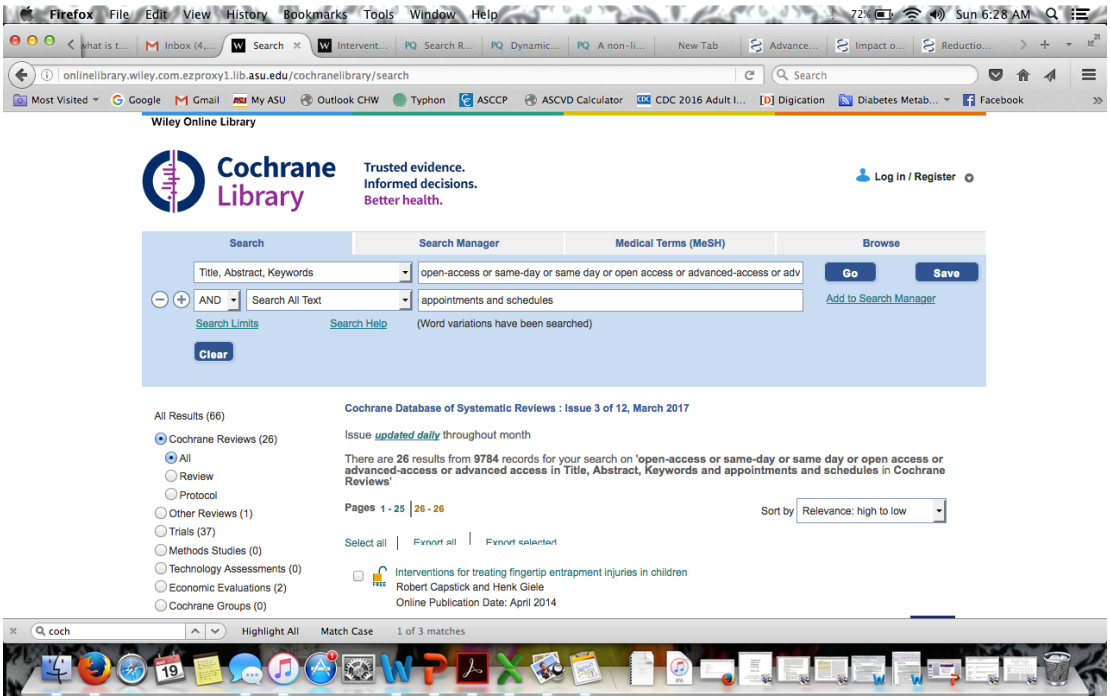
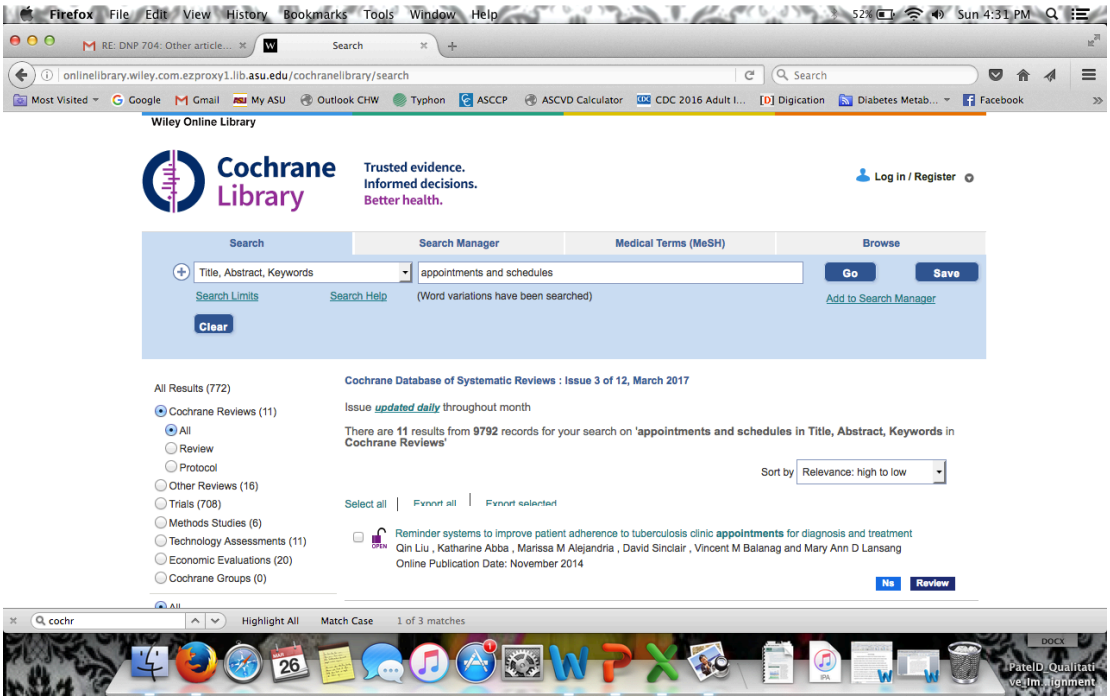
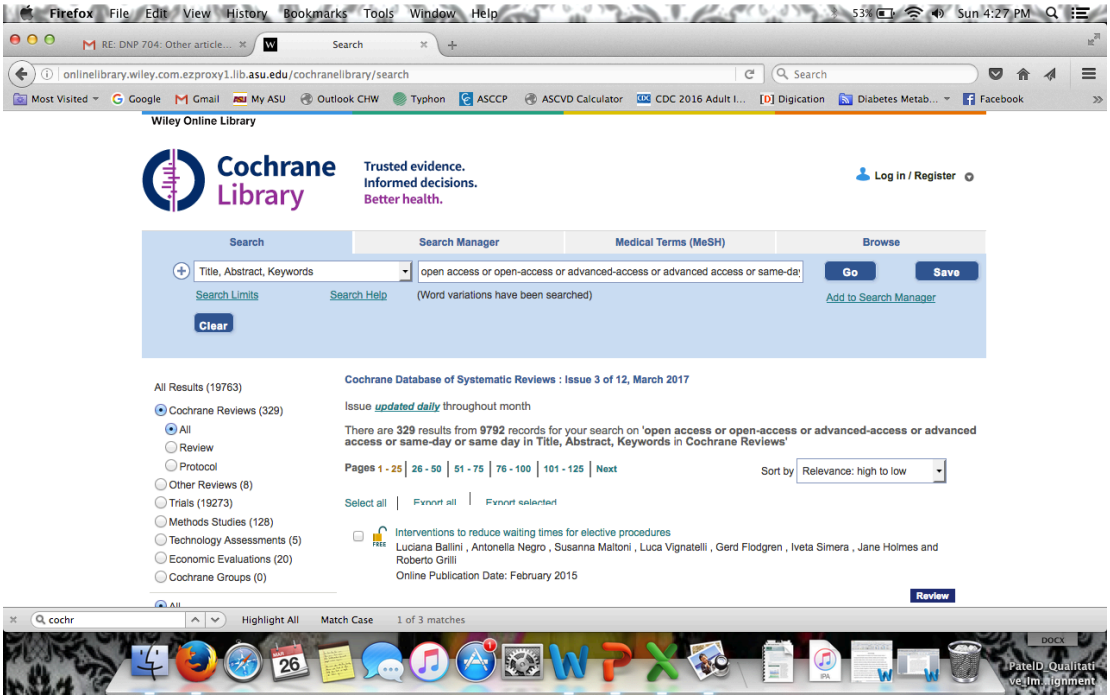
Appendix D

Search Strategy 4

Cochrane



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Cochrane Database of Systematic Reviews : Issue 3 of 12, March 2017
Issue updated daily throughout month
There are 329 results from 9792 records for your search on 'open access or open-access or advanced-access or advanced access or same-day or same day in Title, Abstract, Keywords in Cochrane Reviews'
Pages 1 - 25 | 26 - 50 | 51 - 75 | 76 - 100 | 101 - 125 | Next
Sort by Relevance: high to low
Select all | Export all | Export selected
Interventions to reduce waiting times for elective procedures
Luciana Ballini , Antonella Negro , Susanna Maltoni , Luca Vignatelli , Gerd Flodgren , Iveta Simera , Jane Holmes and Roberto Grilli
Online Publication Date: February 2015
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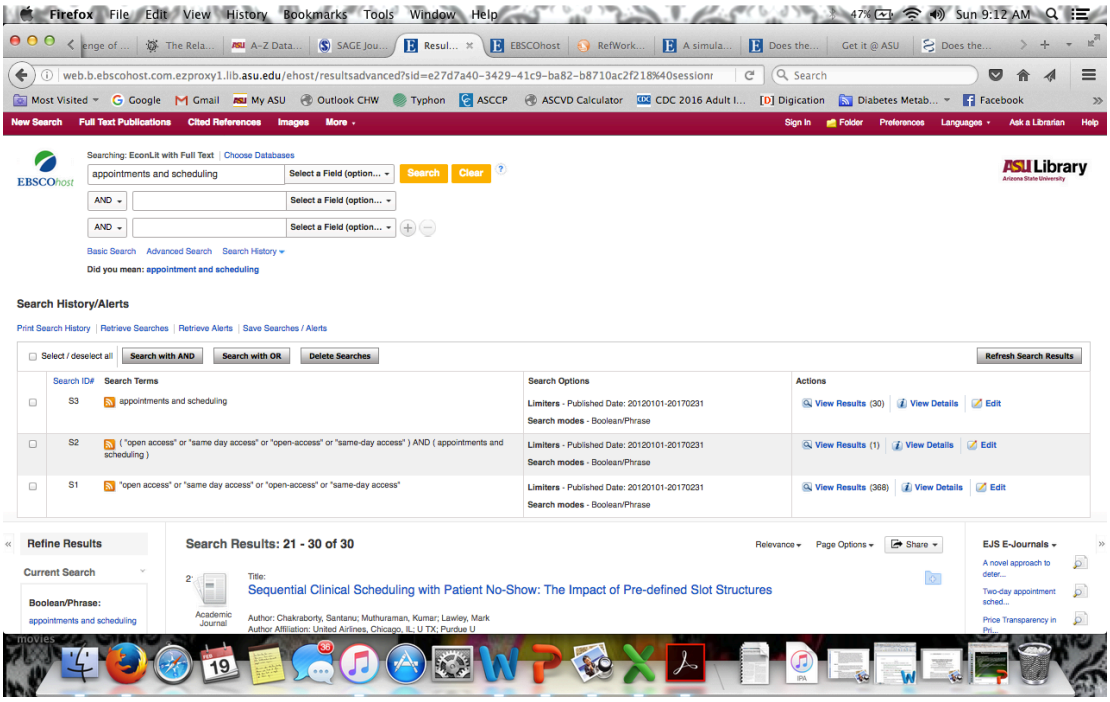
Appendix E

Search Strategy 5

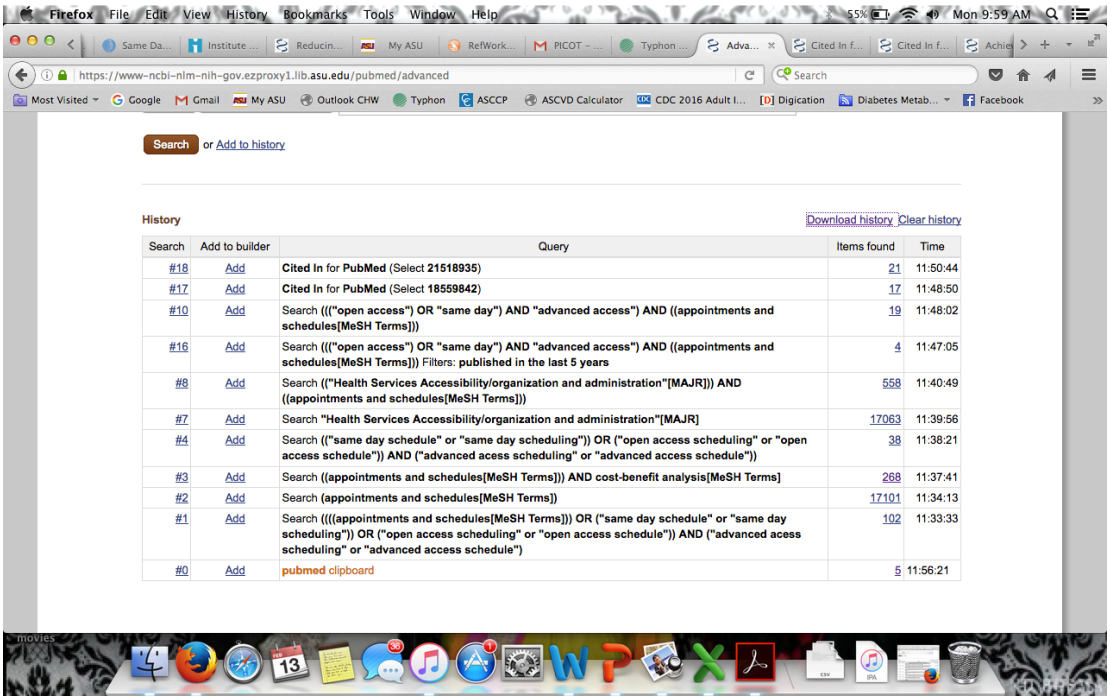
EconLit



Appendix F

Search Strategy 6

PubMed



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History

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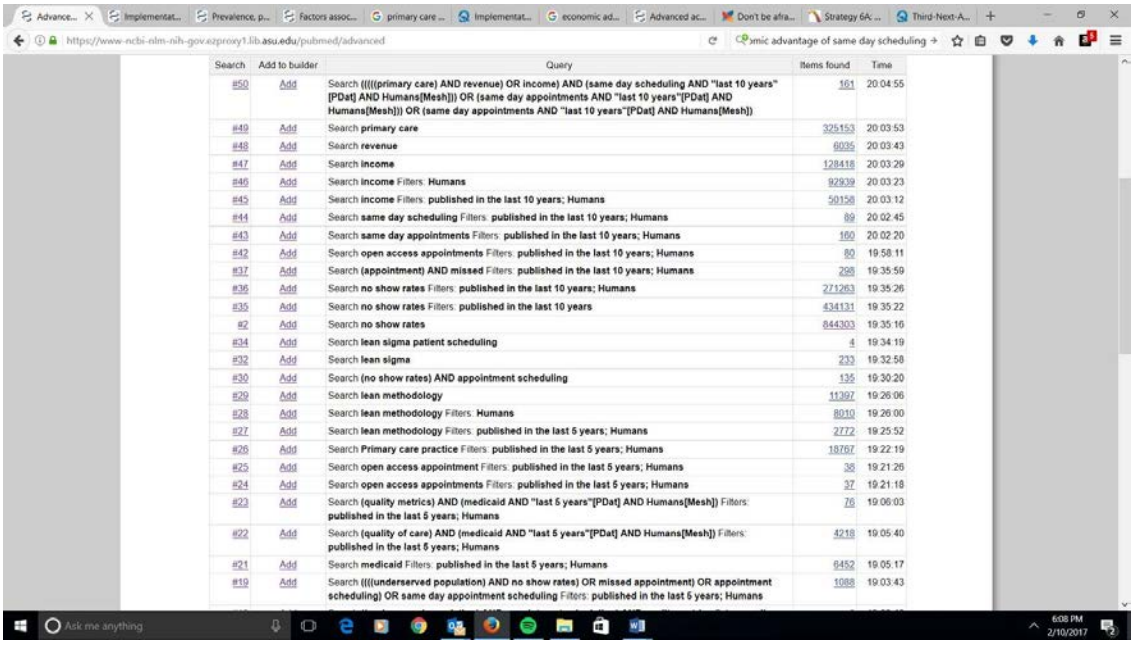
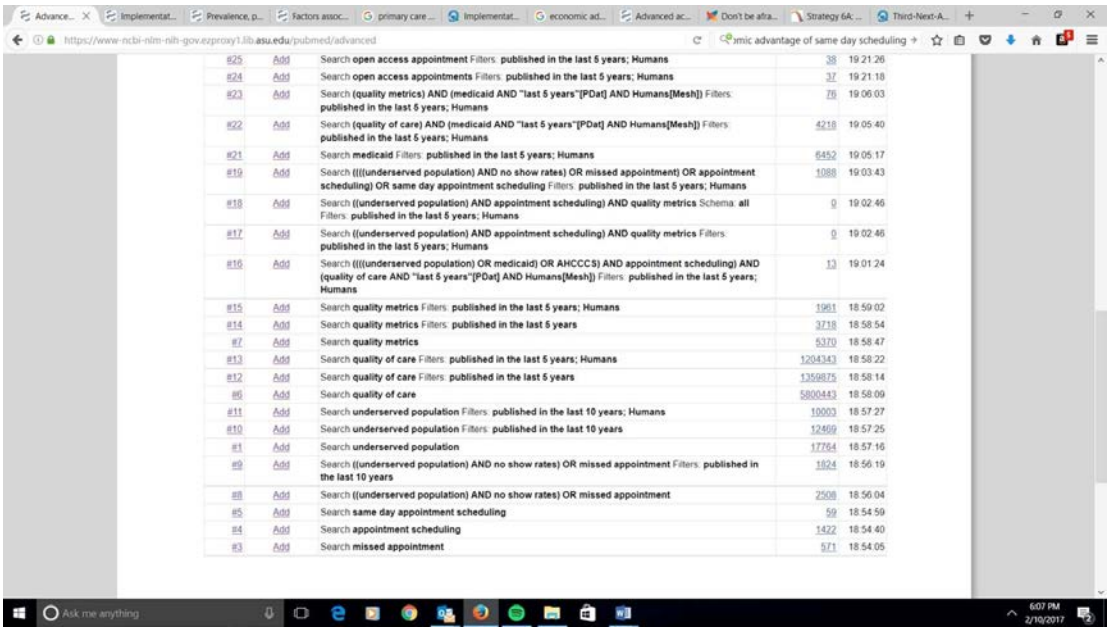
#4	Add	Search **(("same day schedule" or "same day scheduling")) OR ("open access scheduling" or "open access schedule")) AND ("advanced access scheduling" or "advanced access schedule"))**	38	11:38:21
#3	Add	Search **((appointments and schedules[MeSH Terms])) AND cost-benefit analysis[MeSH Terms]**	268	11:37:41
#2	Add	Search **(appointments and schedules[MeSH Terms])**	17101	11:34:13
#1	Add	Search **(((appointments and schedules[MeSH Terms])) OR ("same day schedule" or "same day scheduling")) OR ("open access scheduling" or "open access schedule")) AND ("advanced access scheduling" or "advanced access schedule")**	102	11:33:33
#0	Add	**pubmed** clipboard	5	11:56:21



Search	Add to builder	Query	Items found	Time
#50	Add	Search **((((primary care) AND revenue) OR income) AND (same day scheduling AND "last 10 years"[PDat] AND Humans[Mesh])) OR (same day appointments AND "last 10 years"[PDat] AND Humans[Mesh])) OR (same day appointments AND "last 10 years"[PDat] AND Humans[Mesh])**	161	20:04:55
#49	Add	Search **primary care**	325153	20:03:53
#48	Add	Search **revenue**	6035	20:03:43
#47	Add	Search **income**	128418	20:03:29
#46	Add	Search **income** Filters: **Humans**	92939	20:03:23
#45	Add	Search **income** Filters: **published in the last 10 years; Humans**	50158	20:03:12
#44	Add	Search **same day scheduling** Filters: **published in the last 10 years; Humans**	89	20:02:45
#43	Add	Search **same day appointments** Filters: **published in the last 10 years; Humans**	160	20:02:20
#42	Add	Search **open access appointments** Filters: **published in the last 10 years; Humans**	80	19:58:11
#37	Add	Search **(appointment) AND missed** Filters: **published in the last 10 years; Humans**	298	19:35:59
#36	Add	Search **no show rates** Filters: **published in the last 10 years; Humans**	271263	19:35:26
#35	Add	Search **no show rates** Filters: **published in the last 10 years**	434131	19:35:22
#2	Add	Search **no show rates**	844303	19:35:16
#34	Add	Search **lean sigma patient scheduling**	4	19:34:19
#32	Add	Search **lean sigma**	233	19:32:58
#30	Add	Search **(no show rates) AND appointment scheduling**	135	19:30:20
#29	Add	Search **lean methodology**	11397	19:26:06
#28	Add	Search **lean methodology** Filters: **Humans**	8010	19:26:00
#27	Add	Search **lean methodology** Filters: **published in the last 5 years; Humans**	2772	19:25:52
#26	Add	Search **Primary care practice** Filters: **published in the last 5 years; Humans**	18767	19:22:19
#25	Add	Search **open access appointment** Filters: **published in the last 5 years; Humans**	38	19:21:26
#24	Add	Search **open access appointments** Filters: **published in the last 5 years; Humans**	37	19:21:18
#23	Add	Search **(quality metrics) AND (medicaid AND "last 5 years"[PDat] AND Humans[Mesh])** Filters: **published in the last 5 years; Humans**	76	19:06:03
#22	Add	Search **(quality of care) AND (medicaid AND "last 5 years"[PDat] AND Humans[Mesh])** Filters: **published in the last 5 years; Humans**	4218	19:05:40
#21	Add	Search **medicaid** Filters: **published in the last 5 years; Humans**	6452	19:05:17
#19	Add	Search **((((underserved population) AND no show rates) OR missed appointment) OR appointment scheduling) OR same day appointment scheduling** Filters: **published in the last 5 years; Humans**	1088	19:03:43



Search	Add	Query	Items found	Time
#25	Add	Search **open access appointment** Filters: **published in the last 5 years; Humans**	38	19:21:26
#24	Add	Search **open access appointments** Filters: **published in the last 5 years; Humans**	37	19:21:18
#23	Add	Search **(quality metrics) AND (medicaid AND "last 5 years"[PDat] AND Humans[Mesh])** Filters: **published in the last 5 years; Humans**	76	19:06:03
#22	Add	Search **(quality of care) AND (medicaid AND "last 5 years"[PDat] AND Humans[Mesh])** Filters: **published in the last 5 years; Humans**	4218	19:05:40
#21	Add	Search **medicaid** Filters: **published in the last 5 years; Humans**	6452	19:05:17
#19	Add	Search **((((underserved population) AND no show rates) OR missed appointment) OR appointment scheduling) OR same day appointment scheduling** Filters: **published in the last 5 years; Humans**	1088	19:03:43
#18	Add	Search **((underserved population) AND appointment scheduling) AND quality metrics** Schema: **all** Filters: **published in the last 5 years; Humans**	0	19:02:46
#17	Add	Search **((underserved population) AND appointment scheduling) AND quality metrics** Filters: **published in the last 5 years; Humans**	0	19:02:46
#16	Add	Search **((((underserved population) OR medicaid) OR AHCCCS) AND appointment scheduling) AND (quality of care AND "last 5 years"[PDat] AND Humans[Mesh])** Filters: **published in the last 5 years; Humans**	13	19:01:24
#15	Add	Search **quality metrics** Filters: **published in the last 5 years; Humans**	1961	18:59:02
#14	Add	Search **quality metrics** Filters: **published in the last 5 years**	3718	18:58:54
#7	Add	Search **quality metrics**	5370	18:58:47
#13	Add	Search **quality of care** Filters: **published in the last 5 years; Humans**	1204343	18:58:22
#12	Add	Search **quality of care** Filters: **published in the last 5 years**	1359875	18:58:14
#6	Add	Search **quality of care**	5800443	18:58:09
#11	Add	Search **underserved population** Filters: **published in the last 10 years; Humans**	10003	18:57:27
#10	Add	Search **underserved population** Filters: **published in the last 10 years**	12469	18:57:25
#1	Add	Search **underserved population**	17764	18:57:16
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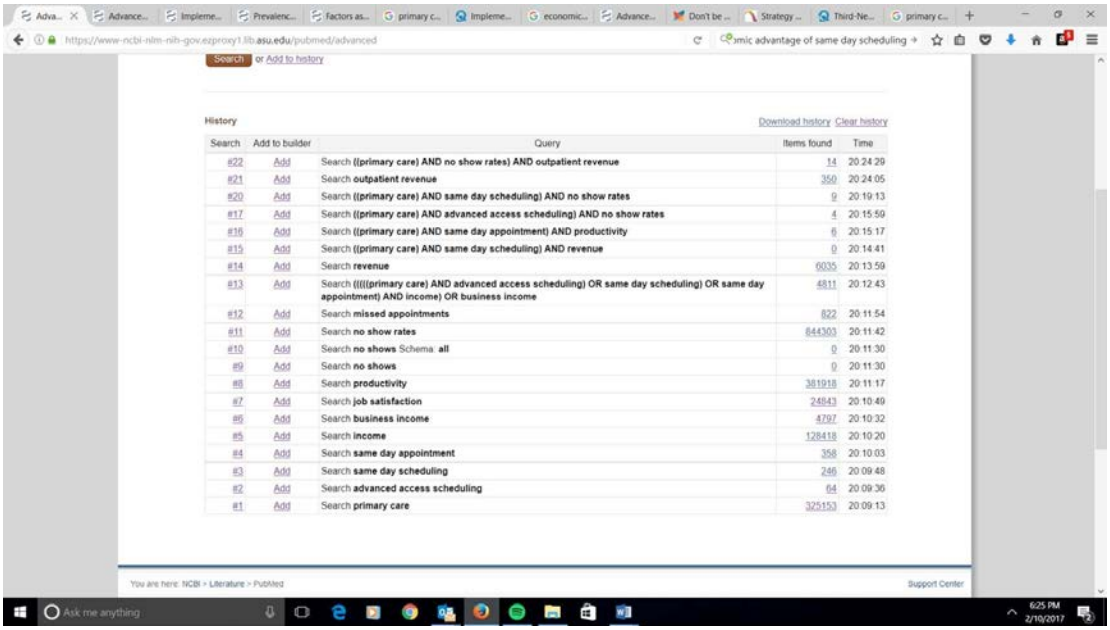
#8	Add	Search **((underserved population) AND no show rates) OR missed appointment**	2508	18:56:04
#5	Add	Search **same day appointment scheduling**	59	18:54:59
#4	Add	Search **appointment scheduling**	1422	18:54:40
#3	Add	Search **missed appointment**	571	18:54:05



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#20	Add	Search **((primary care) AND same day scheduling) AND no show rates**	9	20:19:13
#17	Add	Search **((primary care) AND advanced access scheduling) AND no show rates**	4	20:15:59
#16	Add	Search **((primary care) AND same day appointment) AND productivity**	6	20:15:17
#15	Add	Search **((primary care) AND same day scheduling) AND revenue**	0	20:14:41
#14	Add	Search **revenue**	6035	20:13:59
#13	Add	Search **((((primary care) AND advanced access scheduling) OR same day scheduling) OR same day appointment) AND income) OR business income**	4811	20:12:43
#12	Add	Search **missed appointments**	822	20:11:54
#11	Add	Search **no show rates**	844303	20:11:42
#10	Add	Search **no shows** Schema: **all**	0	20:11:30
#9	Add	Search **no shows**	0	20:11:30
#8	Add	Search **productivity**	381918	20:11:17
#7	Add	Search **job satisfaction**	24843	20:10:49
#6	Add	Search **business income**	4797	20:10:32
#5	Add	Search **income**	128418	20:10:20
#4	Add	Search **same day appointment**	358	20:10:03
#3	Add	Search **same day scheduling**	246	20:09:48
#2	Add	Search **advanced access scheduling**	64	20:09:36
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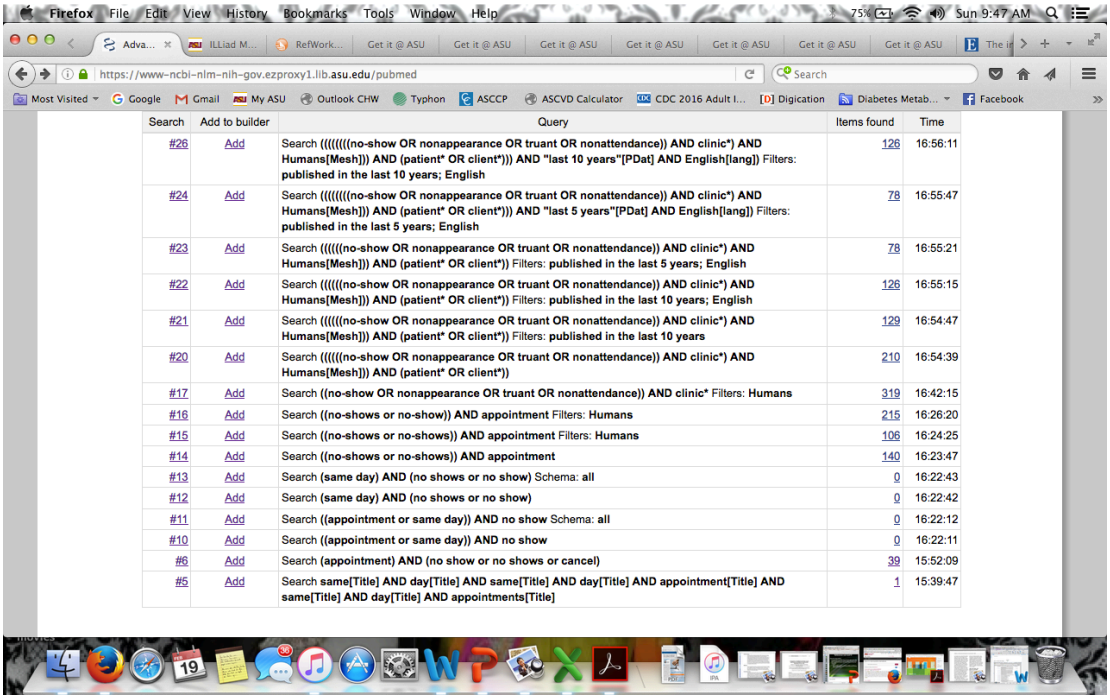

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#24	Add	Search (((((((no-show OR nonappearance OR truant OR nonattendance)) AND clinic*) AND Humans[Mesh])) AND (patient* OR client*))) AND "last 5 years"[PDat] AND English[lang]) Filters: published in the last 5 years; English	78	16:55:47
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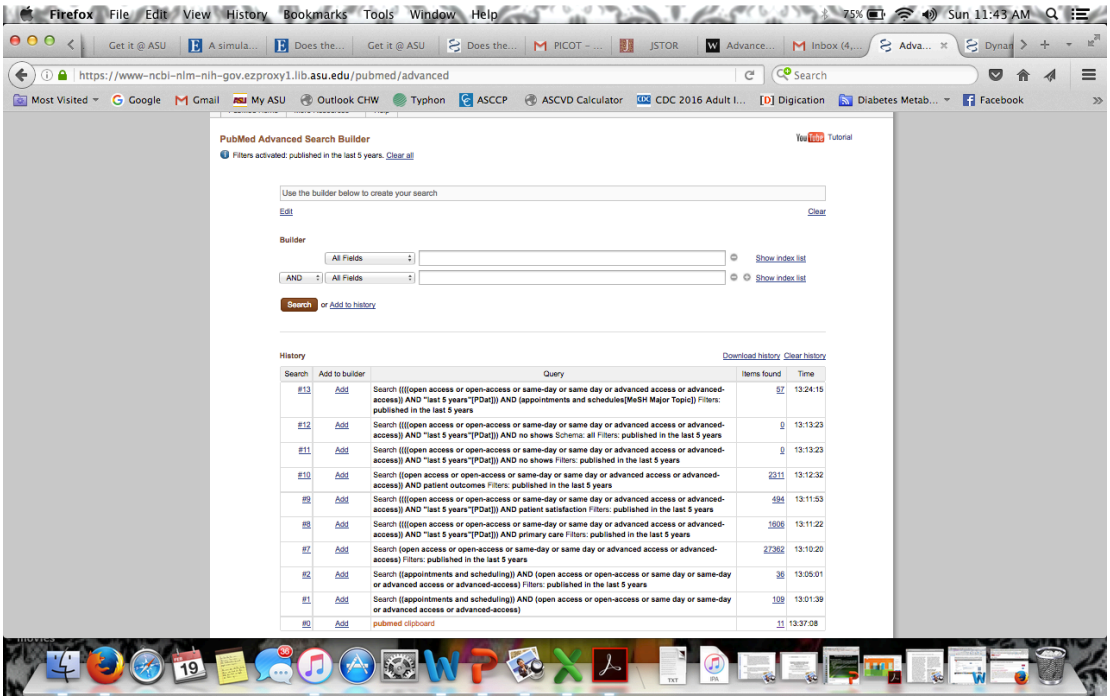
#22	Add	Search ((((((no-show OR nonappearance OR truant OR nonattendance)) AND clinic*) AND Humans[Mesh])) AND (patient* OR client*)) Filters: published in the last 10 years; English	126	16:55:15
#21	Add	Search ((((((no-show OR nonappearance OR truant OR nonattendance)) AND clinic*) AND Humans[Mesh])) AND (patient* OR client*)) Filters: published in the last 10 years	129	16:54:47
#20	Add	Search ((((((no-show OR nonappearance OR truant OR nonattendance)) AND clinic*) AND Humans[Mesh])) AND (patient* OR client*))	210	16:54:39
#17	Add	Search ((no-show OR nonappearance OR truant OR nonattendance)) AND clinic* Filters: Humans	319	16:42:15
#16	Add	Search ((no-shows or no-show)) AND appointment Filters: Humans	215	16:26:20
#15	Add	Search ((no-shows or no-shows)) AND appointment Filters: Humans	106	16:24:25
#14	Add	Search ((no-shows or no-shows)) AND appointment	140	16:23:47
#13	Add	Search (same day) AND (no shows or no show) Schema: all	0	16:22:43
#12	Add	Search (same day) AND (no shows or no show)	0	16:22:42
#11	Add	Search ((appointment or same day)) AND no show Schema: all	0	16:22:12
#10	Add	Search ((appointment or same day)) AND no show	0	16:22:11
#6	Add	Search (appointment) AND (no show or no shows or cancel)	39	15:52:09
#5	Add	Search same[Title] AND day[Title] AND same[Title] AND day[Title] AND appointment[Title] AND same[Title] AND day[Title] AND appointments[Title]	1	15:39:47



PubMed Advanced Search Builder

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Use the builder below to create your search

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Builder

All Fields | Show index list

AND | All Fields | Show index list

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History — Download history | Clear history

Search	Add to builder	Query	Items found	Time
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#8	Add	Search ((((open access or open-access or same-day or same day or advanced access or advanced-access)) AND "last 5 years"[PDat])) AND primary care Filters: published in the last 5 years	1606	13:11:22
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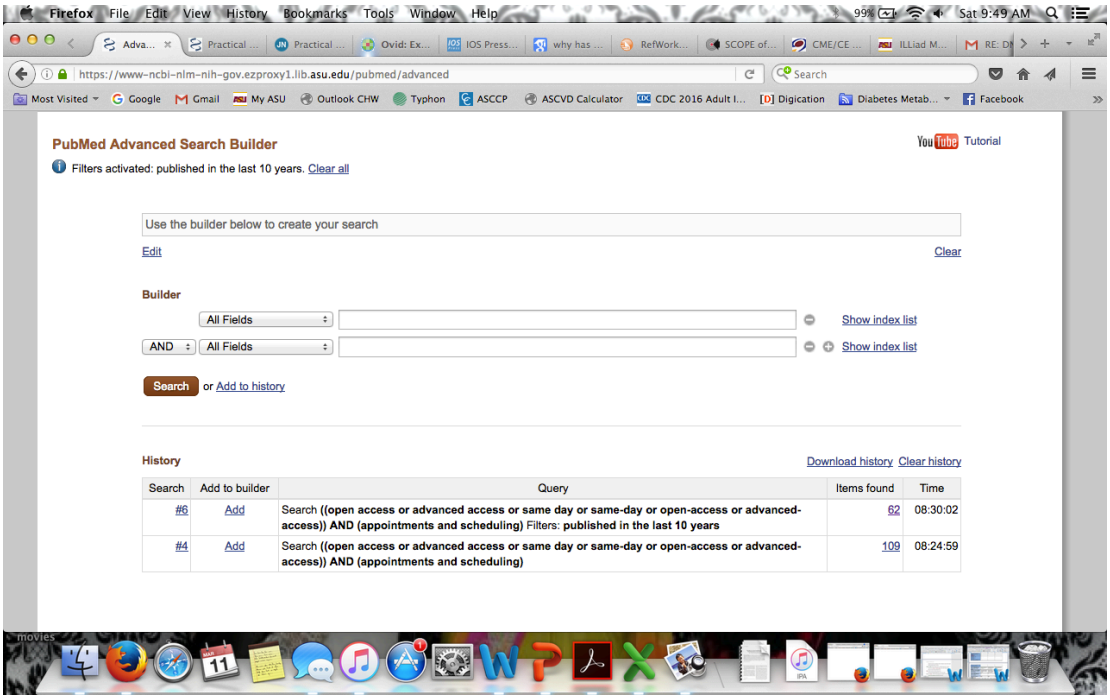
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PubMed Advanced Search Builder
Tutorial
Filters activated: published in the last 10 years. Clear all
Use the builder below to create your search
Edit
Clear
Builder
All Fields
Show index list
AND
All Fields
Show index list
Search or Add to history
History
Download history Clear history
Search | Add to builder | Query | Items found | Time
#6 | Add | Search ((open access or advanced access or same day or same-day or open-access or advanced-access)) AND (appointments and scheduling) Filters: published in the last 10 years | 62 | 08:30:02
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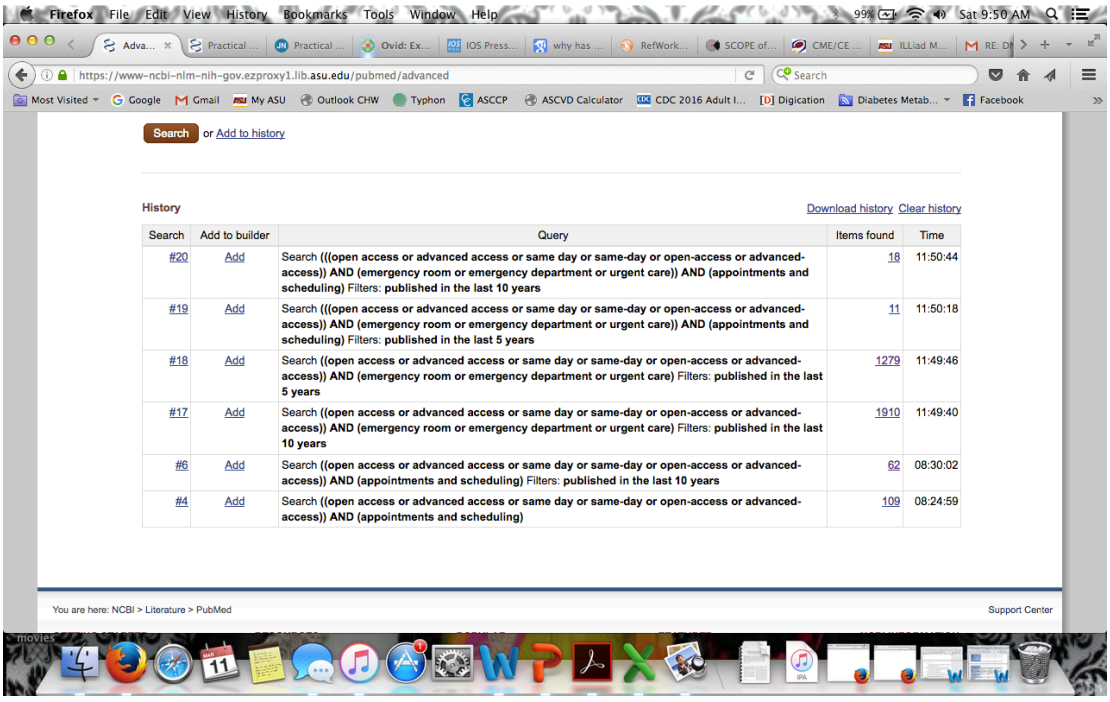
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https://www-ncbi-nlm-nih-gov.ezproxy1.lib.asu.edu/pubmed/advanced
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#18 | Add | Search ((open access or advanced access or same day or same-day or open-access or advanced-access)) AND (emergency room or emergency department or urgent care) Filters: published in the last 5 years | 1279 | 11:49:46
#17 | Add | Search ((open access or advanced access or same day or same-day or open-access or advanced-access)) AND (emergency room or emergency department or urgent care) Filters: published in the last 10 years | 1910 | 11:49:40
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#4 | Add | Search ((open access or advanced access or same day or same-day or open-access or advanced-access)) AND (appointments and scheduling) | 109 | 08:24:59
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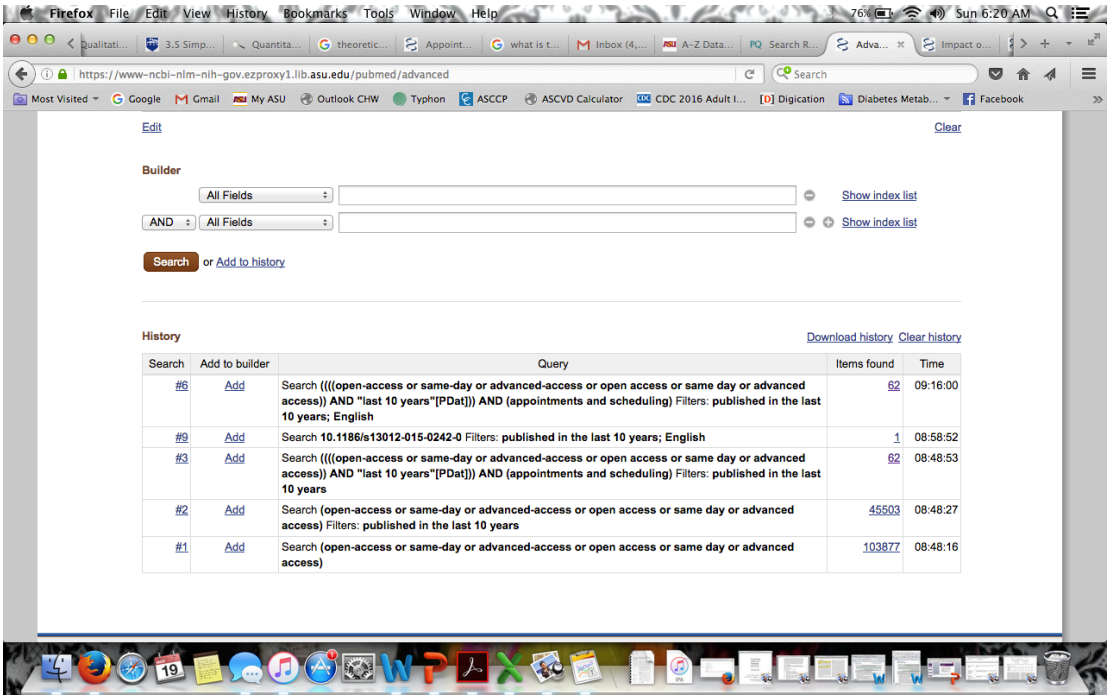
Support Center



Edit | Clear

Builder

All Fields | Show index list

AND | All Fields | Show index list

Search or Add to history

History | Download history | Clear history

Search	Add to builder	Query	Items found	Time
#6	Add	Search **(((open-access or same-day or advanced-access or open access or same day or advanced access)) AND "last 10 years"[PDat])) AND (appointments and scheduling)** Filters: **published in the last 10 years; English**	62	09:16:00
#9	Add	Search **10.1186/s13012-015-0242-0** Filters: **published in the last 10 years; English**	1	08:58:52
#3	Add	Search **(((open-access or same-day or advanced-access or open access or same day or advanced access)) AND "last 10 years"[PDat])) AND (appointments and scheduling)** Filters: **published in the last 10 years**	62	08:48:53
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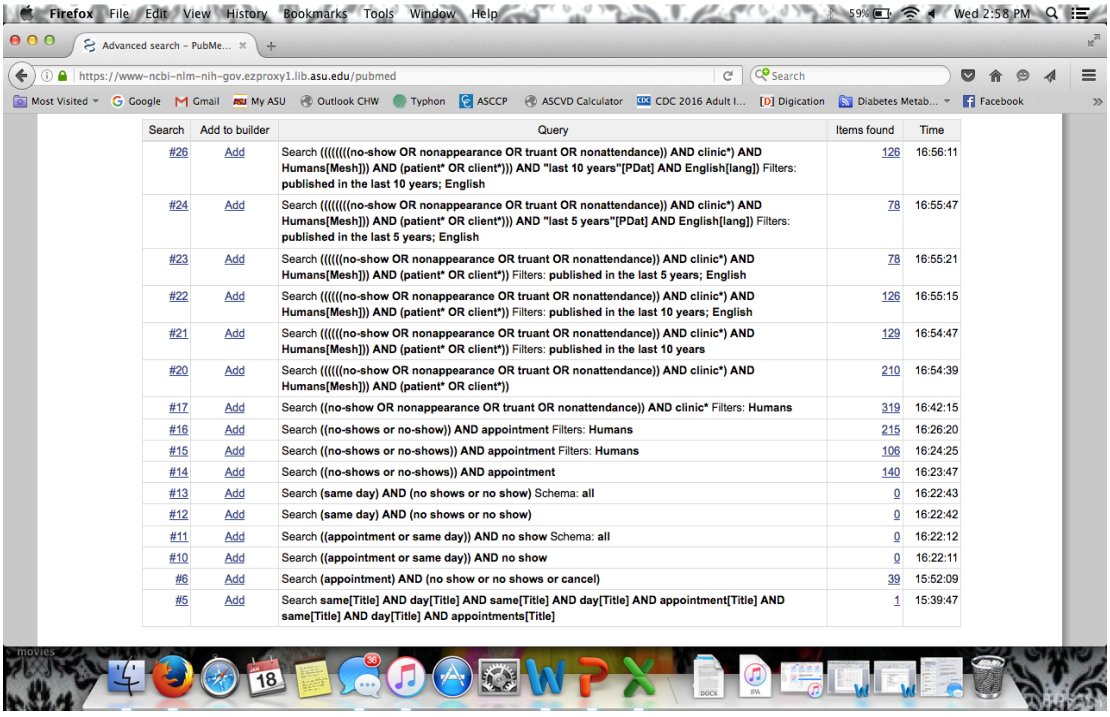

Search	Add to builder	Query	Items found	Time
#26	Add	Search **((((((((no-show OR nonappearance OR truant OR nonattendance)) AND clinic*) AND Humans[Mesh])) AND (patient* OR client*))) AND "last 10 years"[PDat] AND English[lang])** Filters: **published in the last 10 years; English**	126	16:56:11
#24	Add	Search **((((((((no-show OR nonappearance OR truant OR nonattendance)) AND clinic*) AND Humans[Mesh])) AND (patient* OR client*))) AND "last 5 years"[PDat] AND English[lang])** Filters: **published in the last 5 years; English**	78	16:55:47
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#22	Add	Search **((((((no-show OR nonappearance OR truant OR nonattendance)) AND clinic*) AND Humans[Mesh])) AND (patient* OR client*))** Filters: **published in the last 10 years; English**	126	16:55:15
#21	Add	Search **((((((no-show OR nonappearance OR truant OR nonattendance)) AND clinic*) AND Humans[Mesh])) AND (patient* OR client*))** Filters: **published in the last 10 years**	129	16:54:47
#20	Add	Search **((((((no-show OR nonappearance OR truant OR nonattendance)) AND clinic*) AND Humans[Mesh])) AND (patient* OR client*))**	210	16:54:39
#17	Add	Search **((no-show OR nonappearance OR truant OR nonattendance)) AND clinic*** Filters: **Humans**	319	16:42:15
#16	Add	Search **((no-shows or no-show)) AND appointment** Filters: **Humans**	215	16:26:20
#15	Add	Search **((no-shows or no-shows)) AND appointment** Filters: **Humans**	106	16:24:25
#14	Add	Search **((no-shows or no-shows)) AND appointment**	140	16:23:47
#13	Add	Search **(same day) AND (no shows or no show)** Schema: **all**	0	16:22:43
#12	Add	Search **(same day) AND (no shows or no show)**	0	16:22:42
#11	Add	Search **((appointment or same day)) AND no show** Schema: **all**	0	16:22:12
#10	Add	Search **((appointment or same day)) AND no show**	0	16:22:11
#6	Add	Search **(appointment) AND (no show or no shows or cancel)**	39	15:52:09
#5	Add	Search **same[Title] AND day[Title] AND same[Title] AND day[Title] AND appointment[Title] AND same[Title] AND day[Title] AND appointments[Title]**	1	15:39:47

Appendix G

Table 1
Evaluation Table

Citation	Theory/ Conceptual Framework	Design/ Method (Grounded Theory, phenomenology, Narrative…)	Sample/ Setting (describe)	Major Variables studied & their Definitions	Measurement/ Instrumentation (focus group, 1:1, researcher(s)	Data Analysis (stats used)	Findings/ Results/Themes	Level/Quality of Evidence; Decision for practice/ application to practice/Generalization
Cameron et al. (2010) Adoption of OAS in an academic family practice Country: Canada No funding discussed No conflicts or biases recognized	Inferred to be the queuing theory	Design: Prospective and retrospective Quantitative Study Method: Collection of empirical data Purpose: In order to reduce WTs and reduce missed appts by implementing OASS.	Pre-I # of PTS seen: 21,838 Post-I # of PTS seen: 21819 Demo: NRep Setting: 2-site academic practice in Halifax, NS Exclusion: None Attrition: NREP	IV: OAS DV1: TTTA/WT DV2: NS/MA DV3: PV	TTAA	*t* tests (to determine significance between the two time periods)	TTAA: ↓ BI: 13.7days AI: 3.6days (P<.0001) NS: ↓ BI: 3.3% AI: 1.89% (P<.001) Pt Volume: Unchanged (P<0.1%) Statistically significant reduction in NS, even though numbers were already low	**Level:** VI **Strengths:** LR and NI. **Weaknesses:** TTAA results entered manually; however by the same person Multiple changes of clerical staff during trial Differences in how NS were entered into system **Conclusion:** OAS resulted in ↓ WT and NS. **Feasibility**: Useful in practice due to the many successful findings, LC; however difficulty

AA-advanced access; **AAS**-appointment access scheduling; **AfAm**-African American; **appt**-appointment; **appts**-appointments; **AR**-attrition rate; **BP**-blood pressure; **CA**-California; **CC**-continuity of care; **CS**-cohort sample; **CEPOCG**-cochrane effective practice and organization of care group; **CG**-control group; **CHC**-community health center; **CV**-control variable; **DB**-double booking; **Demo**-demographics; **DM**-demographics; **DV**-dependent variable; **EC**-emergent care; **ED**-emergency department; **EPC**-emergent and primary care; **F**-female; **FY**-fiscal year; **HC**-health centers; **HCU**-healthcare utilization; **HMO**-health maintenance organization; **HS**-health systems; **IT**-idle time; **IV**- independent variable; **IG**-intervention group; **LC**=lipid control; **LD**-length of day; **LDT**-lead time; **LR**-low risk; **LT**- length of time; **M**-medicaid; **MA**-missed appointments; **MM**-multiple methods; **MHS**-military health systems; **MSMG**-multispecialty medical group; **N**-number of studies; **n**- number of participants; **N/A**-not applicable; **NCRR**- national center for research resources; **NF**- number of faculty participants; **NHS**-national health service practices; **NI**-non invasive; **NP**-nurse practitioner; **NR**-number of resident participants; **NRep**-not reported; **NS**-no shows; **NW**-network; **NSR**-no show rate; **OA**-open access; **OAS**-open access scheduling; **OASS**-open access scheduling system; **OP**-outpatient; **OT**-overtime; **PC**-primary care; **PCont**-provider continuity; **PHS**- Pittsburgh healthcare system; **PM**-physician morale; **Post-I**-post intervention **Pre-I**-pre intervention; **PS**-patient satisfaction; **PSA**-patient satisfaction appointments; **PSO**-patient satisfaction overall; **Psych**-psychiatric; **PT**-patient; **PTH**-physical therapy; **PTS**-patients; **PVERC**-Pittsburgh Veteran Engineering Resource Center; **RCT**-randomized control trial; s-satisfaction; **ScSy**- scheduling system; **SD**-same day; SDA-same day appointments; **SO**-small office; **SS**-staff satisfaction; **TC**-teaching clinic; **TMgmt**-time management; **TS**-traditional schedule; **TTAA**-time to third appointment available; **TPS**-total patient population; **UK**-united kingdom, **USA**-United States of America, **USM**-united states military; **UVOEC**-university of Virginia outpatient eye clinic; **UWFMRP**-university of Wisconsin family medicine residence clinic; **VA**-veteran affairs; **VHA**-Veteran health administration; **WC**-working conditions; **WFMC**-wingra family medical center; **WL**-workload.

								with implementation
Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables studied & their Definitions	Measurement/ Instrumentation (focus group, 1:1, researcher(s)	Data Analysis (stats used)	Findings/ Results/Themes	Level/Quality of Evidence; Decision for practice/ application to practice/Generalization
DuMontier et al. (2013) A multi-method intervention to reduce NS in an urban residence clinic Country: USA	Inferred to be the wider social system, health care utilization theory, theory of planned behavior, and the transtheoretical model.	Design: Prospective and retrospective quantitative cohort study Method: Mixed-method with the collection of empirical data and open-ended	Demo: TPS: N=8974; F5079 (57%) AfAm=1856 (21%) 26-44=3006 (34%) M=2132 (24%) CS:	IV: OAS DV1: NS	Interview clinical staff Open-ended survey (in-person or telephone) Wisconsin Department of Family Medicine's Clinical Data	Chi-square tests (to determine NS rate and number of active pts before and after the interventions) Significance level of	NS total population: BI: 10% AI: 7.06% (P<0.001) =6,086 more appts NS cohort: BI: 33.26%	**Level:** IV **Strengths:** provider and staff commitment Persistence over time rather than short-term measures No changes in the # of active patients seen Clinic has been present in same community for

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No funding discussed No conflicts or biases recognized		interviews Purpose: If the use of MM – an educational program focused on the NS cohort, modified method of DB and modified AA can help decrease the NSR.	n=141; F 114 (81%) AfAm=98 (70%) 26-44=57 (40%) M= 108 (77%) Setting: WFMC, a residency TC of the UWFMRP Exclusion: None Attrition: NREP		Warehouse – EPIC EMR	0.05% was assumed for all tests.	AI: 17.71% (P<0.001) =6,086 more appts	40years Spanish-speaking faculty LR and NI **Weaknesses:** Assessed the effects of multiple interventions making it difficulty to determine the effects of each Unable to see if patients went to other health systems, UC or ED's Provider turnover Mixed providers and NS rate **Conclusion:** Significant decrease in NS noted **Feasibility:** Recommended due to the ↓in NS rates, ↓WT and ↑TTAA.
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Fournier et al. (2015) Implementation	Inferred to be a process model (quality implementation	Design: Discussion Purpose: To	Demo: NREP due to type of design	IV1: AAS DV1: PS	Observation or statements/comments made by patients, providers, staff.	NRep	Through observation and statements made by various	**Level:** VII **Strengths:** ↓costs, LR and NI

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of an AA scheduling system in primary healthcare: One clinics experience. Country: Canada No funding discussed No conflicts or biases recognized	framework)	discuss the experience associated with implementation of AAS – in an effort to decrease WT for primary healthcare by increasing efficiency.	Setting: NP led clinic Exclusion: NREP Attrition: NREP				members of the team, the following findings were found: ↑ PS as indicated from positive feedback from patients regarding new scheduling system. >85% were able to schedule appointments on the SD or ND.	AAS allowed providers to provide care in a timely manner, increasing patient-provider rapport and pt satisfaction **Weaknesses:** Must determine if accessibility or efficiency is the focus of implementation of AAS Mindful of new patients that are enrolled Only implemented in 1 NP clinic Unmet client expectations Team flexibility Triage calls and skill building **Conclusion:** ↑PS, ↓ER visits, walk-ins. **Feasibility:** Due to numerous + effects of AAS, likely recommended
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				their Definitions	researcher(s)			practice/Generalization
McMullen et al. (2015) Lead time for appt and the no-show rate in an ophthalmology clinic Country: USA No funding discussed No conflicts or biases recognized	Lead time model and NSR model	Design: Cross-sectional retrospective quantitative study Purpose: If there is a correlational difference with no-show rates if appts are scheduled in advance versus closer to the appt time	Demo: Total appt sample: N=46,655 nr=14066 nf=32589 Setting: UOVEC Exclusion: None discussed. Attrition: NREP	DV1: NS DV2: LT (time from scheduled appt to actual appt IV: NRep	Data obtained from computerized scheduling database at UOVEC	Z-test (comparison of proportions test)	At 6mo likelihood of appt kept for- Faculty: 58.8% Residents: 41.1% NS rate: Faculty: 21.7% Residents: 6.6% (P<0.001) Lead time of 0-2wks, NS rate for- Faculty: 9.1% Residents: 2.4% Would notice a 60%↓ in NS for resident clinic if all pts were scheduled 0-2 weeks out	**Level: VI** **Strengths:** LR, NI **Weaknesses:** Cross-sectional study Did not assess short-term appt scheduling strategy PS and CO was not measured Use of RS was not used to determine f/u rates. Did not assess reason for longer time to appt. Did not determine the reason in NS rate between faculty and residents Did not assess impact of current telephone reminders that were in place on NS rate. **Conclusion:** NS ↑when LT↑ **Feasibility:** SD or AA will ↓NS rates according to predictive models;

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								therefore, likely to be feasible in practice
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Mitchell (2008) Same-day booking – success in a Canadian family practice Country: Canada No funding discussed No conflicts or biases recognized	Inferred to be the queuing theory	Design/method: Anecdotal observations and experience Purpose: Providing access to appts in a timely manner so that patient care can be improved	Demo: NREP due to type of study Setting: A family practice in Halifax, NS. Exclusion: None Attrition: NREP	IV: same-day booking DV1: NS DV2: PS	Scheduling of daily appointments, clearing back log, and log calls to determine number of appts and follow up appts. Over 1 wk pd, surveys to 100 pts at random was given regarding the new scheduling system	NRep	Eliminate WT 🡻 NS 🡹PS (93% of pts satisfied with system)	**Level:** VII **Strengths:** Observation of positive results, LR and NI **Weaknesses:** May be difficult to implement AAS if there is a large portion of chronic care and elderly pts, but this did not seem to be a problem for the pts in this clinic. Baseline and post implementation data are not available since it was an informal study **Conclusion:** Experience in implementing SD booking provided 🡹PS,

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								and physician satisfaction, ↓NS, stable income and unchanged physician burden **Feasibility:** Likely to be feasible due to positive outcomes observed, unknown if findings were statistically significant or not.
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Richter et al. (2017) Does the proportion of same-day and 24-hour appts impact PS? Country: USA No funding discussed No conflicts or biases recognized	Inferred to be a process model (quality implementation framework)	Design: Survey Purpose: To determine if there is a relationship between PS and OAS with OP facilities	Demo: N=32,364,957 encounters and surveys in 32 facilities from 7/13-5/15 Setting: Outpatient facilities in the MHS Exclusion: None Attrition: NREP	IV1: SDA IV2: 24-hour appts DV1: PS – able to see provider when needed DV2: PSO CV1: Patient perception of health CV2: Age CV3: Gender (all male) C4: Size (total encounters)	Schedule manager managed schedules MHS Management Analysis and Reporting Tool (M2) -ad hoc query tool that manages and oversees healthcare operations (APLSS) -a provider-level satisfaction tool	Panel time-series analysis with GEE to look at the various observations in each sample	Significant association with PS with SDA compared to appointments 24-hours ago.	**Level:** VI **Strengths:** LR aind NI 3.9million army beneficiaries – substantial population **Weaknesses:** Only army facilities Unable to test for causality **Conclusion:** Army-facilities specifically should implement same-day access **Feasibility:** Strongly suggest SDA and ↑PS with this – especially in army facilities
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Robinson et al. (2010) A comparison of traditional and open-access policies for appt scheduling Country: NREP No funding discussed No conflicts or biases recognized	Traditional scheduling policy Open-access policy Inferred to be a process model (quality implementation framework)	Design: Comparison study with the use of variables Method: Model formulations using equations Purpose: To determine whether or not OAS will be better than the TS in WT, doctor's IT, and the doctors OT. Thus, looking at which ScSy will effect costs in the office and in which system is preferred under different conditions	Demo: NRep Setting: NRep Exclusion: NRep Attrition: NRep	IV1: OAS IV2: TS DV1: NS probability	Nonlinear integer program	Marginal analyses	↓NS	**Level: III** **Strengths:** LR and NI First paper to compare traditional and OAS under respective sources of variability's **Weaknesses:** Fails to look at other possible variabilities **Conclusion:** if NS>5%, OAS is preferred **Feasibility:** OAS is preferred over traditional appt scheduling

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Rose et al. (2011) AA scheduling outcomes: A systematic review Country: USA and UK Funding: CTSA Grant from NCRR; however no biases present from funding agency since they did not have a role in the design and conduct of the study Bias: 2 reviewers independently assessed risk for bias using the CEPOCG Risk of Bias criteria.	Inferred to be a process model (quality implementation framework)	Design: A systematic review of meta-analyses described in a qualitative method Purpose: To determine how implementing AA scheduling affect patient, physician, and practice outcomes	Demo: N= 28 studies n=24 distinct studies that provided different interventions (24) implementations (1) RCT (6) concurrent control group (21) pre/post studies (22) USA (6) UK (24) implementations TTAA(8) NSR(11) PSO(4) PSA (4) CC (9) HCU(2) Setting: Multiple: Teaching	IV: AAS DV1: NS	NRep	NRep	NS: 11 studies had NS rate from 116-43%, and reduced NS rate from -24%-0 in at least 5 studies.	**Level:** V **Strengths:** Systematic review LC, NI, LR **Weaknesses:** lack of follow-up and effects on CO Articles were not all randomized One study included contamination and crossover bias Some studies had self-selected intervention groups Other practice initiatives with AA **Conclusion:** AA decrease WT and NS rates LR and NI Specifically, ↓ in reducing TTAA. **Feasibility:** Very likely to be feasible due to the multiple number of studies that have shown positive affects of OAS

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-(1) substantial contamination and crossover bias (6)-implemented other practice initiatives concurrently with AA -all others included self-selected intervention groups -publication bias No conflicts recognized			practices (6) NHS (5) CHC (2) VA (3) USM (1) Varied (1) HS with SO (1) NW of neighborhood HC (1) MSMG (1) HMO (1) NRep (1) Exclusion: Conference abstracts, commentaries, editorials, and narratives not written in scientific format. Attrition: NREP					
Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables studied & their Definitions	Measurement/ Instrumentation (focus group, 1:1, researcher(s)	Data Analysis (stats used)	Findings/ Results/Themes	Level/Quality of Evidence; Decision for practice/ application to practice/Generalization
Wojciechowski (2012)	Urgent care model	Design: Case Study	Demo: NRep	IV: OAS	PVERC and Office of Systems Redesign	NRep	NS reduced from 20% to	**Level:** VII

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Open access scheduling Country: USA No funding discussed No conflicts or biases recognized		Method: Mixed-method with the collection of empirical data and open-ended interviews Purpose: To determine if implementing OAS will help decrease NS	Setting: PTH services at the VA PHS Exclusion: None Attrition: NREP	DV1: NS	Group used flow simulations with computer models to schedule patients		10% ↑Efficiency, revenue, ↓ downtime Saving 8days over 6-month period	**Strengths:** Initially determined reasons NS were occurring. LR, NI and LC **Weaknesses:** Study regarding PT/OccT Pilot program **Conclusion:** Reduction of NS noted with OAS implementation **Feasibility:** Most likely to be successful in a clinical practice
Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables studied & their Definitions	Measurement/ Instrumentation (focus group, 1:1, researcher(s)	Data Analysis (stats used)	Findings/ Results/Themes	Level/Quality of Evidence; Decision for practice/ application to practice/Generalization
Yoon et al. (2015) The relationship between same-day access and continuity in primary care and emergency department	Inferred to be a process model quality implementation framework) Comparative quantification of health risks	Design: Multi-level regression model Purpose: To determine how ED visits for health conditions were related to SD access and	Demo: PC clinics (22) within (3) VHA medical systems Setting: VHA medical systems in Southern CA Exclusion:	IV1: Clinic-level measures of access IV2: PCont FY2010-FY2012 IV3: health status IV4: pt factors	ICD-9 codes Area Resource File (ARF) Charlson Index – Deyo-Quan approach	One-way ANOVA Significance level of P<0.01	10%↑ access to same-day care decreased non-emergent visits by 7% (P<0.001) ↓ in EC but PC treatable	**Level: IV** **Strengths:** SD access in PC related to fewer ED visits for all-cause, non-emergent and PC treatable visits. **Weaknesses:** Veteran clinic study only

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visits Country: USA Funding: VA however, no bias is indicated by the VA as they did not have a role in this study. No conflicts or biases recognized		CC in PC offices.	Less frequent use of PC Deceased between 2009-2012 Attrition: NREP	DV1: non-EC DV2: Treatable EPC DV3: Preventable ED care DV4: Non-preventable ED care			visits also noted	No information on ED visits from non-VHA providers covered by non-VHA services Measures of access was not validated in study Data on study practices regarding whether they were practicing based on NCQA guidelines or not was not measured Possibility that this study may not be generalizable to outside of a VHA system since VHA is highly integrated with a national EMR. **Conclusion:** Improvements in PC access can ↓ ED visits for non-emergent and PC treatable events **Feasibility:** Since this study is consistent with prior veteran and non-veteran clinics, it is likely to be successful in multiple clinics.

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Appendix H

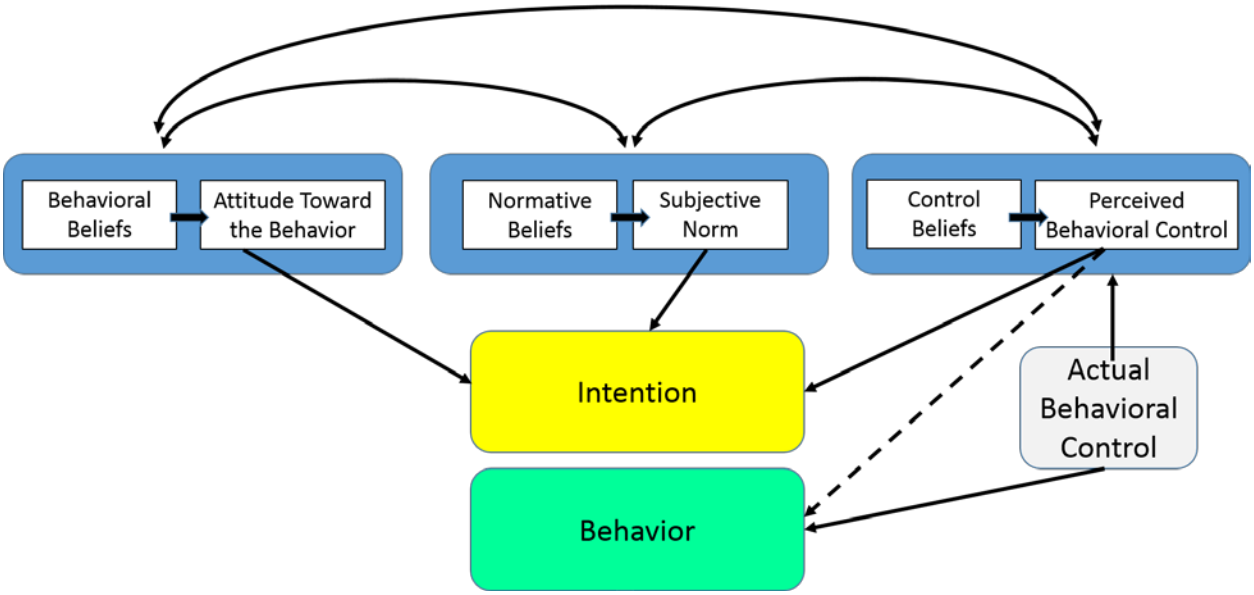
Table 2
Synthesis Table

Author	**Cameron**	**DuMontier**	**Fournier**	**McMullen**	**Mitchell**	**Richter**	**Robinson**	**Rose**	**Wojciechowski**	**Yoon**
Year	2010	2013	2015	2015	2008	2017	2010	2011	2012	2015
Setting/Population	Academic practice	Residency teaching clinic	NP led clinic	UOVEC	Family practice	Outpatient facilities in military health system	N/A	Variety	Physical therapy and occupational therapy in VA setting	VHA medical system
Design	PR quantitative study	PR quantitative cohort study	Discussion	CSS retrospective study	Anecdotal observations and experience	Survey	Comparison study with the use of variables	SR of MTA in a qualitative study	CS	Multi-level regression model
Study Level	VI	IV	VII	VI	VII	VI		V	VII	IV
IV										
OAS	X	X	X		X	X	X	X	X	X
DV										
PS			↑		↑	↑				
NS/MA	↓	↓		↓	↓		↓	↓	↓	
ER/UC visits										↓
Revenue/Costs			↓costs		unchanged				↑revenue	
Wait time	↓				↓		↓	↓		
Lead time				↓						

CS-case study; **CSS**-cross sectional; **DV**-dependent variable; **ER**-emergency room; **IV**-independent variable; **MA**-missed appointments; **MTA**-meta analyses; **NP**-nurse practitioner, **NS**-no shows; **OAS**-open access scheduling; **PR**-prospective and retrospective; **PS**-patient satisfaction; **SR**-systematic review; **UC**-urgent care; **UVOEC**-university of Virginia outpatient eye clinic; VA-veteran affairs; **VHA**-veteran health administration

Appendix I

Theory of Planned Behavior



Appendix J

Ottawa Model of Research