



July 2019

MEDICARE

Limited Information Exists on the Effects of Synchronizing Medication Refills

GAO Highlights

Highlights of [GAO-19-520](#), a report to congressional committees

Why GAO Did This Study

Medication adherence—that is, taking medications as prescribed—is important because not doing so increases the risk of hospitalization and can result in avoidable medical costs. According to some pharmacy industry groups, medication synchronization may help improve medication adherence, particularly for patients with multiple chronic conditions. More than 40 percent of Medicare beneficiaries had two or more chronic conditions in 2015.

Congress included a provision in the Bipartisan Budget Act of 2018 for GAO to review and report on the use of medication synchronization. In this report, GAO examines (1) what is known about the use and potential effects of medication synchronization and (2) steps CMS and selected states have taken to support its use.

GAO identified and reviewed 22 peer-reviewed studies on medication synchronization. In addition, GAO interviewed CMS officials and 30 stakeholders to gather a wide range of perspectives on medication synchronization. Among others, GAO interviewed six selected pharmacies and two selected Medicare health plans. GAO also reviewed CMS regulations as well as medication synchronization laws from five selected states that vary by geographic region.

GAO provided a draft of this report to the Department of Health and Human Services, which provided technical comments. GAO incorporated these comments, as appropriate.

View [GAO-19-520](#). For more information, contact James Cosgrove at (202) 512-7114 or CosgroveJ@gao.gov.

July 2019

MEDICARE

Limited Information Exists on the Effects of Synchronizing Medication Refills

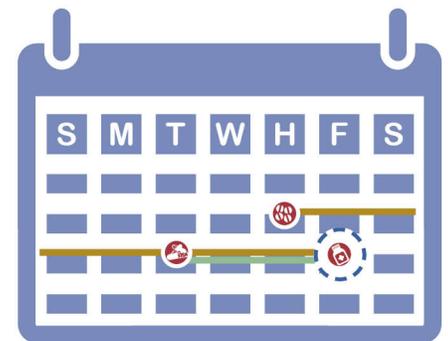
What GAO Found

Medication synchronization is a process whereby a pharmacist aligns the refill dates of two or more of a patient's medications to a single day (see figure below). GAO found that no comprehensive national data exist on the extent to which medication synchronization has been used or its potential effects. However, limited information suggests that the use of medication synchronization has increased in recent years and that it may have benefits. According to a study published in the American Journal of Managed Care that examined survey data on retail pharmacies, the number of pharmacies using medication synchronization increased from 3,324 in 2013 to 5,534 in 2014. Most of the studies that GAO identified found positive effects from medication synchronization, primarily on patients. For example, a 2018 study reported a 3 percent improvement in medication adherence among patients using medication synchronization than those who were not. Several stakeholders also identified potential limitations of using medication synchronization. For example, some patients may not be able to afford paying all the copayments for their medications at one time each month, and some patients prefer the social interaction of multiple trips to the pharmacy each month.

Synchronizing Medication Refills

To initially align the refill dates of multiple medications, a pharmacist may refill one or more medications with a quantity for less than a month's supply (for example, 8 days' supply [■] and 3 days' supply [■]). When synchronized, the medications can be picked up on a single day every month.

Source: GAO analysis. | GAO-19-520



The Centers for Medicare & Medicaid Services (CMS) issued a regulation and some states enacted laws that may help support the use of medication synchronization. While CMS does not have a formal medication synchronization policy for Medicare, a CMS regulation allows for reduced beneficiary cost sharing (for example, a lower copayment) when the beneficiary receives less than a month's supply of a medication. Similar laws pertain to private health plans that provide prescription drug coverage for patients in the five states GAO selected—Georgia, Illinois, Maine, Texas, and Washington. Such measures support medication synchronization because initially aligning the refill dates of multiple medications may require one or more of these medications to be refilled with a quantity that is less than a month's supply. Officials from CMS and four of the selected pharmacies said that lowering the copayments for these refills reduces the financial burden on patients when they first have their medications synchronized. They noted that requiring full copayments for a shorter supply may have discouraged or prevented patients from using medication synchronization.

Contents

Letter		1
	Background	4
	Limited Information Suggests the Use of Medication Synchronization Has Increased; Some Studies and Stakeholders Reported Several Potential Benefits and Limitations	8
	A CMS Regulation and Laws in Selected States May Support the Use of Medication Synchronization, Such as By Reducing Patient Cost Sharing	17
	Agency Comments	21
Appendix I	Information about Stakeholders Interviewed	24
Appendix II	GAO Contact and Staff Acknowledgments	25
Bibliography		26
Table		
	Table 1: Information about Stakeholders Interviewed	24
Figures		
	Figure 1: Example of Initiating Medication Synchronization for a Patient	5
	Figure 2: Example of Copayment Costs for a Medicare Beneficiary Using Medication Synchronization With and Without Proration	19

Abbreviations

CMS	Centers for Medicare & Medicaid Services
HHS	Department of Health and Human Services

This is a work of the U.S. government and is not subject to copyright protection in the United States. The published product may be reproduced and distributed in its entirety without further permission from GAO. However, because this work may contain copyrighted images or other material, permission from the copyright holder may be necessary if you wish to reproduce this material separately.



July 15, 2019

Congressional Committees

Patients who do not take—that is, adhere to—their medications as prescribed are at increased risk for hospitalization. Medication adherence is particularly important for patients with one or more chronic conditions, such as diabetes, high cholesterol, or hypertension. In 2015, about 24 million of the 55 million Medicare beneficiaries had two or more chronic conditions, and Medicare spent over \$307 billion for these beneficiaries, according to data from the Centers for Medicare & Medicaid Services (CMS).¹ Almost 4 million Medicare beneficiaries had a prescription that they did not fill that year—one potential sign that beneficiaries are not taking their medications as prescribed.² Studies have shown that in the United States, the failure to adhere to medications results in avoidable medical costs annually, such as costs associated with hospitalizations and emergency department visits.³

¹Medicare is a federal health insurance program for people age 65 and older, individuals under 65 with certain disabilities, and individuals diagnosed with end-stage renal disease. GAO's estimate of beneficiaries with chronic conditions is based on those enrolled in Medicare fee-for-service in 2015; it does not include beneficiaries enrolled in Medicare Advantage, which provides health benefits through private health plans. See CMS, *Medicare Current Beneficiary Survey Chartbook* (2015) and CMS, *Chronic Conditions among Medicare Beneficiaries*, accessed February 28, 2019, https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Chronic-Conditions/Chartbook_Charts.html.

²GAO's estimate of beneficiaries who had a prescription that they did not fill in 2015 is based on those who lived in the community during the entire year. It does not include beneficiaries who were in a long-term care facility at any point during the year. See CMS, *Medicare Current Beneficiary Survey Chartbook*.

³For example, see New England Healthcare Institute, *Thinking Outside the Pillbox: A System-Wide Approach to Improving Patient Medication Adherence for Chronic Disease* (2009); M. Christopher Roebuck, Joshua N. Liberman, Marin Gemmill-Toyama, and Troyen A. Brennan, "Medication Adherence Leads to Lower Health Care Use and Costs Despite Increased Drug Spending," *Health Affairs*, vol. 30, no. 1 (2011): pp. 91-99. One study estimates that these costs could total as much as \$290 billion per year. Studies have cited several reasons for patients not adhering to medications, such as forgetting to take them, procrastinating on refilling them, or thinking that they are not needed. For example, see Reethi N. Iyengar, Abbey L. LeFrancois, Rochelle R. Henderson, and Rebecca M. Rabbitt, "Medication Nonadherence Among Medicare Beneficiaries with Comorbid Chronic Conditions: Influence of Pharmacy Dispensing Channel," *Journal of Managed Care & Specialty Pharmacy*, vol. 22, no. 5 (2016): pp. 550-560; Walid F. Gellad, Jerry Grenard, and Elizabeth A. McGlynn, *A Review of Barriers to Medication Adherence: A Framework for Driving Policy Options* (Santa Monica, Calif.: RAND Corporation, 2009).

To improve medication adherence, some pharmacy industry groups have advocated for the use of medication synchronization, a process whereby a pharmacist aligns the refill dates of all of a patient's medications so that they can be dispensed on a single day.⁴ These industry groups have reported that medication synchronization may improve adherence, particularly for patients with multiple chronic conditions or those who have difficulty managing their medications, by preventing missed refills and disruptions in their medication regimen.⁵ As of 2019, 27 states had enacted laws related to medication synchronization, according to the National Community Pharmacists Association.

The Bipartisan Budget Act of 2018 includes a provision for us to review and report on the use of medication synchronization.⁶ This report describes

1. what is known about the use and potential effects of medication synchronization, and
2. steps CMS and selected states have taken to support the use of medication synchronization.

To determine what is known about the use and potential effects of medication synchronization, we reviewed 22 peer-reviewed studies on medication synchronization published between October 2013 and October 2018.⁷ We identified these studies by searching several bibliographic databases, including Google Scholar, PubMed, ProQuest, and Scopus. We also searched for additional studies from other sources, including citations in the studies we reviewed. Seventeen of the 22 studies evaluated the effects of medication synchronization for patients, pharmacies, or health plans. The results of these evaluative studies are

⁴For the purpose of this report, we use the term "medications" to mean prescription medications, which do not include over-the-counter medications. Additionally, medications that can be synchronized generally are those that are refilled on a recurring basis, such as medications to manage chronic conditions. Certain medications, such as antibiotics or controlled substances, generally are not synchronized.

⁵For example, see National Community Pharmacists Association, *Simplify My Meds: Pharmacy Operations Manual* (2018); Lindsay L. Watson and Benjamin M. Bluml, *Pharmacy's Appointment Based Model: Implementation Guide for Pharmacy Practices* (American Pharmacists Association Foundation, 2013).

⁶Pub. L. No. 115-123, § 50351, 132 Stat. 63, 211.

⁷For the purpose of this report, we examined medication synchronization for Medicare beneficiaries and patients with private prescription drug coverage.

not generalizable. The remaining five studies were systematic literature reviews that provided an overview of research on medication synchronization. For a complete list of the 22 studies we reviewed, see the Bibliography page at the end of this report.

For additional information on the use and effects of medication synchronization, we interviewed 30 stakeholders that we identified through background research. The 30 stakeholders, among others, included organizations representing patients, pharmacies or pharmacists, and health plans, experts who worked on issues related to medication synchronization, and selected pharmacies and health plans. We interviewed officials from six selected pharmacies—including four retail pharmacy chains, one independent retail pharmacy, and one mail order pharmacy.⁸ We selected these pharmacies to represent different sizes and types of pharmacies and experience with medication synchronization. We also interviewed officials from two selected Medicare health plans. We selected these plans because they were among the top five Medicare plans in terms of the number of Medicare beneficiaries that had prescription drug coverage as of August 2018. Together, the two health plans offered prescription drug coverage to about 14 million Medicare beneficiaries. While we selected stakeholders to include a broad range of perspectives, their views are not generalizable beyond the 30 stakeholders interviewed. Additional information about the 30 stakeholders is presented in appendix I. We also interviewed CMS officials.

To describe efforts by CMS and selected states to support the use of medication synchronization, we reviewed CMS regulations and laws in five selected states. The five states—Georgia, Illinois, Maine, Texas, and Washington—were selected because they varied in geographic region and had laws related to medication synchronization as of 2018. In addition, we interviewed CMS officials regarding agency regulations that may support the use of medication synchronization. We also asked the 30

⁸A retail pharmacy chain is part of a group of four or more pharmacies under common ownership. There are various definitions of independent pharmacies. In this report, we use the definition from the National Council for Prescription Drug Programs, which defines an independent pharmacy as one to three pharmacies under common ownership. Mail order pharmacies are highly automated facilities that fill prescriptions from a central location and deliver the medications directly to the patient. The six retail pharmacies we selected, collectively, serve patients across nearly 25,000 pharmacies, according to information provided to us by these pharmacies.

stakeholders we interviewed about their views on how CMS regulations and state laws have supported medication synchronization.

We conducted this performance audit from June 2018 to July 2019 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings based on audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings based on our audit objectives.

Background

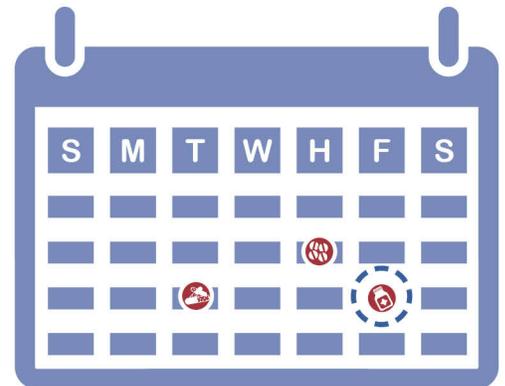
Medication Synchronization

Medication synchronization is a process whereby a pharmacist aligns the refill dates of two or more of a patient's medications to a single day each month—referred to as the synchronization date. Patients who are interested in medication synchronization must enroll or opt into the service, if offered at their pharmacy. To initiate medication synchronization, the pharmacist selects an anchor medication to which the other medications are synchronized, and dispenses short fills—that is, a quantity of less than a month's supply—so that the patient has enough medication until the next synchronization date. Figure 1 illustrates the process by which a pharmacist may synchronize three medications for a patient.

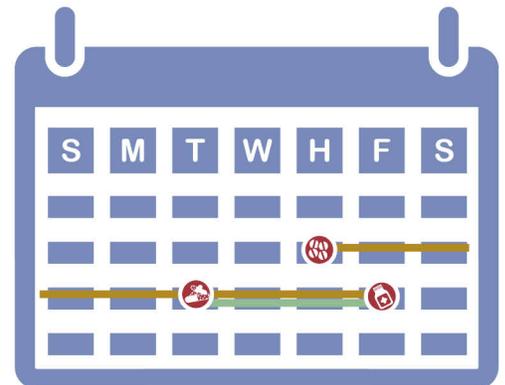
Figure 1: Example of Initiating Medication Synchronization for a Patient

The patient has three medications that are refilled on different days. To initiate medication synchronization:

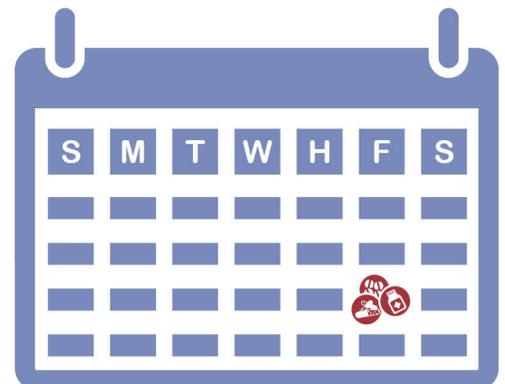
The pharmacist selects an anchor medication (Medication A= 📅)—generally, the medication with the highest copayment—to which the other medications are synchronized.^a The aligned refill date is referred to as the synchronization date.



To synchronize the patient's two remaining medications (B= 📅 and C= 📅), the pharmacist may dispense a short fill—that is, instead of a month's supply, the pharmacist may refill each medication with the quantity needed until the synchronization date. In this case, the pharmacist may dispense an 8-day supply (📅) for Medication B and a 3-day supply (📅) for Medication C.



The patient's medications are now synchronized and can be picked up on a single day every month.



Source: GAO analysis. | GAO-19-520

^aA copayment is usually a fixed dollar amount paid by patients for a medication.

Before each synchronization date, the pharmacist generally contacts the patient to determine if the patient has had any changes in his or her medications or medical history. The pharmacist then makes any needed adjustments so that the patient can continue to pick up his or her medications on the synchronization date and avoid disruptions in their medication regimen.

Prescription Drug Expenditure and Coverage

In 2017, national spending on prescription drugs dispensed by pharmacies totaled over \$330 billion. Medicare accounted for over \$100 billion and private health plans accounted for over \$140 billion of total spending on prescription drugs that year.⁹

Medicare provides prescription drug coverage under Part D, a voluntary program in which beneficiaries can elect to enroll.¹⁰ In February 2019, about 45 million or three-fourths of Medicare beneficiaries were enrolled in Part D plans—including stand-alone prescription drug plans and Medicare Advantage prescription drug plans, which combine medical and prescription drug benefits.¹¹ In comparison, in 2017, about 200 million

⁹These expenditures represent spending on retail prescription drugs sold in retail chain and independent pharmacies and through mail order and do not include prescription drugs provided by nursing homes or other institutions. The remaining \$92 billion spent on prescription drugs was, for example, for patients with other health insurance coverage, such as through Medicaid, the Department of Defense, and the Department of Veterans Affairs. See CMS, *National Health Expenditure Data Fact Sheet*, accessed February 22, 2019, <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NHE-Fact-Sheet.html>.

¹⁰Medicare consists of four parts. Parts A and B are known as original Medicare or Medicare fee-for-service. Part C is Medicare Advantage, under which beneficiaries receive health benefits through private health plans. Part D provides the outpatient prescription drug benefit and is offered by private health plans. Medicare Part D was established by the Medicare Prescription Drug, Improvement, and Modernization Act of 2003, Pub. L. No. 108-173, tit. I, 117 Stat. 2066, 2071 (codified as amended at 42 U.S.C. §§ 1395w-101 et seq.).

¹¹Enrollment numbers for February 2019 were the most recent data available. See CMS, *Medicare Enrollment Dashboard*, accessed April 25, 2019, <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/CMSProgramStatistics/Dashboard.html>.

patients were enrolled in a private health plan that provides prescription drug coverage, among other benefits, according to CMS.¹²

Health plans that provide prescription drug coverage interact with both patients and pharmacies. For patients, health plans may vary their benefits with regards to cost-sharing arrangements—such as copayments for medications—and quantity limits for medications covered—such as restricting the dosage or number of refills of a medication provided within a given period of time.¹³ For pharmacies, health plans pay pharmacies a share of the medication costs and a dispensing fee for the pharmacies' administrative costs in preparing and dispensing the medication.

¹²Enrollment numbers for 2017 were the most recent data available. See CMS, *National Health Expenditure Data Fact Sheet*, accessed March 29, 2019, <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NHE-Fact-Sheet.html>.

For the purpose of this report, we use the phrase “health plans” to refer to both Medicare Part D plans and private plans that provide prescription drug coverage to patients.

¹³Cost sharing may include copayments—a fixed dollar amount—or coinsurance—a percentage of the cost—paid by patients for a medication. For the purpose of this report, we use copayments as an example of cost sharing.

Limited Information Suggests the Use of Medication Synchronization Has Increased; Some Studies and Stakeholders Reported Several Potential Benefits and Limitations

One Study and Several Stakeholders Suggest the Use of Medication Synchronization Has Increased in Recent Years

Limited information available indicates that the use of medication synchronization has increased, but comprehensive data on its use by pharmacies and patients do not exist. Among the 22 peer-reviewed studies we identified, one study reported that the use of medication synchronization increased among pharmacies and patients.¹⁴ Specifically, the study examined survey data on the use of medication synchronization in retail pharmacies and reported that the number of retail pharmacies using medication synchronization increased from 3,324 in 2013 to 5,534 in 2014, a 66 percent increase. In addition, the study found that the number of patients using medication synchronization at these retail pharmacies increased from 124,608 in 2013 to 438,100 patients in 2014. We did not identify other studies that examined the use of medication synchronization.

Officials from all five selected pharmacies that reported using medication synchronization told us that their pharmacies have increased their use of medication synchronization, but they generally could not provide us with data on their patients' use of medication synchronization over time. The pharmacies included three retail pharmacy chains—two large national

¹⁴See Alexis A. Krumme, Danielle L. Isaman, Samuel F. Stolpe, J. Samantha Dougherty, and Niteesh K. Choudhry, "Prevalence, Effectiveness, and Characteristics of Pharmacy-Based Medication Synchronization Programs," *American Journal of Managed Care*, vol. 22, no. 3 (2016): pp. 179-186.

chains and one mid-size regional chain—one independent pharmacy, and one mail order pharmacy. Officials from four of these pharmacies told us that they started using medication synchronization within the last 5 years; officials from the fifth pharmacy told us that they started using medication synchronization in 2011. For example, officials from the two large retail pharmacy chains, each with about 10,000 pharmacies nationwide, told us that they first piloted medication synchronization to a small number of pharmacies in either 2015 or 2016. One of these chains now uses medication synchronization at all of its pharmacies, and the other is in the process of doing so. Officials from the mid-size retail pharmacy chain stated that they piloted medication synchronization in 2011 with about 2,500 patients enrolled across 50 pharmacies. They have since expanded it to about 83,000 patients across all their more than 90 pharmacies.

Seven other stakeholders, including those representing patients and pharmacies, also told us that the use of medication synchronization has increased in recent years, but generally did not provide data on the increase. In addition, officials from an organization representing pharmacies told us that as of 2018, approximately 80 percent of independent pharmacies offered medication synchronization; however, they could not provide data from prior years.

Studies and Stakeholders Suggest that Medication Synchronization Can Be Beneficial to Patients, Pharmacies, and Health Plans

Limited information exists on the effects of medication synchronization, but available studies and stakeholders indicate several potential benefits, primarily for patients. According to CMS officials, CMS does not have data on the effects of medication synchronization, such as patient medication adherence; other stakeholders we interviewed indicated that such national data do not exist. Seventeen of the 22 peer-reviewed studies we identified evaluated the effects of medication synchronization—14 of these studies evaluated effects for patients and the rest for pharmacies and health plans. However, the data reported by

these studies are limited in scope and are not generalizable to broader populations.¹⁵

Twelve of 14 peer-reviewed studies evaluating the potential effects of medication synchronization for patients reported two potential benefits—improved medication adherence or improved medical outcomes.¹⁶

- **Improved medication adherence.** Twelve peer-reviewed studies that evaluated the potential effects of medication synchronization on patients' adherence reported that medication synchronization improved adherence. For example, nine of the 12 studies compared medication adherence among patients using and not using medication synchronization and found that medication adherence was greater among patients using medication synchronization—one of the most recent studies showed adherence was 3 percent higher for those using medication synchronization.¹⁷ Two studies compared

¹⁵Many of the 17 peer-reviewed studies that evaluated the effects of medication synchronization examined a limited patient population, and in some cases, also evaluated medication synchronization at a single pharmacy or pharmacy chain. Also, the results are subject to several methodological limitations. For example, eight studies examining the effects of medication synchronization on adherence reported self-selection as a study limitation—some noted that because enrollment in medication synchronization is voluntary, the enrolled patients who participated in the studies were more likely to be committed to improving their adherence and thus, would have better adherence compared with those not enrolled. Also, the evaluation time frames for the 13 studies that examined the effect of medication synchronization on adherence ranged from 3 to 12 months; the time frames were under 12 months in more than half of the studies, generally considered too short to adequately capture the long-term effects of medication synchronization. In addition, the 14 studies that evaluated the effects of medication synchronization for patients did not evaluate whether effects varied by patient socioeconomic status.

¹⁶Two other peer-reviewed studies also examined the effects of medication synchronization on patients. One of these two studies found that an education program for patients was more effective at improving adherence than medication synchronization. See Kristen L. DiDonato, Kristin R. Vetter, Yifei Liu, Justin R. May, and D. Matthew Hartwig, "Examining the Effect of a Medication Synchronization or an Education Program on Health Outcomes of Hypertensive Patients in a Community Pharmacy Setting," *INNOVATIONS in Pharmacy*, vol. 5, no. 3 (2014): pp. 1-9. The other study assessed patient satisfaction with medication synchronization and found that participants were highly satisfied. See Kendra T. Butler, Janelle F. Ruisinger, Jessica Bates, Emily S. Prohaska, and Brittany L. Melton, "Participant Satisfaction with a Community-Based Medication Synchronization Program," *Journal of American Pharmacists Association*, vol. 55, no. 5 (2015): pp. 534-539.

¹⁷Alexis A. Krumme, Robert J. Glynn, Sebastian Schneeweiss, Joshua J. Gagne, J. Samantha Dougherty, Gregory Brill, and Niteesh K. Choudhry, "Medication Synchronization Programs Improve Adherence to Cardiovascular Medications and Health Care Use," *Health Affairs*, vol. 37, no. 1 (2018): pp. 125-133.

medication adherence among patients before and after using medication synchronization and found that adherence improved after synchronization was started—the most recent of these studies showed an improvement of 2 percent in average adherence after a year of enrollment.¹⁸ The last study reported that 56 percent of patients surveyed stated that they would be more adherent to their medications if their refills were synchronized.¹⁹ In addition, eight of these studies evaluated the effects of medication synchronization for patients with different chronic conditions and found differences by type of chronic condition.²⁰ According to the studies, medication adherence improves as a result of medication synchronization because it simplifies the refilling process.

- **Improved medical outcomes.** One peer-reviewed study reported that medication synchronization may also lead to improved medical outcomes for patients.²¹ The study found that rates of hospitalization and emergency department visits and rates of outpatient visits were 9 percent and 3 percent lower, respectively, among patients using medication synchronization compared with those who were not.

Stakeholders also cited improved medication adherence and medical outcomes as potential benefits for patients, and also identified additional benefits that may result from medication synchronization. Specifically, 14 of the 15 stakeholders representing patient and pharmacy organizations and selected pharmacies we interviewed said that medication synchronization may help improve patients' medication adherence, and 12 of these stakeholders said that it may improve patients' medical outcomes. These stakeholders also indicated other potential benefits for patients:

¹⁸Nancy Dao, Sun Lee, Micah Hata, and Lord Sarino, "Impact of Appointment-Based Medication Synchronization on Proportion of Days Covered for Chronic Medications," *Pharmacy*, vol. 6, no. 2 (2018): pp. 1-9.

¹⁹Alexander Ross, Humaira Jami, Heather A. Young, and Richard Katz, "Sync and Swim: The Impact of Medication Consolidation on Adherence in Medicaid Patients," *Journal of Primary Care & Community Health*, vol. 4, no. 4 (2013): pp. 240-244.

²⁰For example, two studies found that among patients using medication synchronization, those taking medications for high cholesterol or diabetes showed a greater increase in adherence compared with those taking medications for hypertension.

²¹Krumme, Glynn, Schneeweiss, Gagne, Dougherty, Brill, and Choudhry, "Medication Synchronization Programs," p. 125.

-
- **Improved convenience.** Medication synchronization improves convenience for patients—for example, by reducing the number of trips patients need to make to the pharmacy or making it easier to manage their medications, according to 10 of the 15 stakeholders representing patient and pharmacy organizations and selected pharmacies. Fewer trips to the pharmacy help to minimize the need for transportation arrangements, which is particularly important for older patients, patients who live in rural areas, and patients who lack reliable transportation. Five of the 10 stakeholders added that medication synchronization simplifies patients' experience with managing their medications—patients no longer need to keep track of multiple refill dates for all their medications. Under medication synchronization, the pharmacists proactively perform this work and send reminders to the patients.
 - **Increased interaction between pharmacists and patients.** Seven of 15 stakeholders representing patient and pharmacy organizations and selected pharmacies told us that medication synchronization increases the interaction patients have with their pharmacists, which may help patients better manage their medication regimens and improve their overall health. For example, a stakeholder representing pharmacies said that prior to the medication synchronization date, pharmacies generally contact patients to confirm that their medications should be filled; as part of this outreach, they also inquire about any changes in the patients' medical history or therapy. If such changes are identified, pharmacists follow up with patients, and their physicians if necessary, to ensure that patients receive refills reflecting any necessary medication changes. In addition, according to some stakeholders, if a consultation is also provided on the medication synchronization date, pharmacists have more opportunities to answer patients' questions about medication use, provide counseling, and offer patients other auxiliary services. For example, some stakeholders told us that pharmacists may provide screenings for blood pressure and diabetes, or recommend immunizations to patients when they pick up their medications. Because pharmacists regularly assess patients' medical history in preparing for medication synchronization, they can target patients who

may be at high risk for medical problems or immunization-preventable diseases.²²

Regarding pharmacies, some studies and stakeholders identified the following potential benefits of medication synchronization.

- **Operational efficiencies.** Three peer-reviewed studies reported that medication synchronization can lead to operational efficiencies. For example, one study reported that medication synchronization can help pharmacists better manage inventory and personnel costs and improve workflow.²³ Nine out of 12 stakeholders representing pharmacy organizations and selected pharmacies also said that medication synchronization can lead to improvements in operational efficiencies. For example, officials from one organization representing pharmacies said that pharmacists save time when they can dispense all of a patient's medications at one time instead of several times throughout the month.
- **Increased marketability of pharmacies to health plans.** According to one peer-reviewed study and five of the 12 stakeholders representing pharmacy organizations and selected pharmacies, the extent to which a pharmacy's medication synchronization program improves patient care, such as by improving medication adherence, may make the pharmacy more desirable to health plans. For example, according to the study and officials from one organization representing pharmacies, health plans may include pharmacies with highly adherent patients in the plans' preferred pharmacy networks.²⁴ Pharmacies in preferred pharmacy networks can offer lower medication prices, attracting more customers.

²²Adults aged 65 or older are at increased risk of complications from immunization-preventable diseases, such as influenza and pneumonia. The Centers for Disease Control and Prevention recommend influenza and pneumococcal immunizations for these individuals. In 2015, the agency reported that, in the United States, over 30 percent and over 36 percent of individuals 65 years old or older did not receive the yearly influenza and pneumococcal immunizations, respectively.

²³David Holdford and Kunal Saxena, "Impact of Appointment-Based Medication Synchronization on Existing Users of Chronic Medications," *Journal of Managed Care & Specialty Pharmacy*, vol. 21, no. 8 (2015): pp. 662-669.

²⁴Health plans may also provide pharmacies with financial incentives for improved medication adherence. See Jessica L. Hinson, Gretchen K. Garofoli, and Betsy M. Elswick, "The Impact of Medication Synchronization on Quality Care Criteria in an Independent Community Pharmacy," *Journal of the American Pharmacists Association*, vol. 57, no. 2 (2017): pp. 236-240.

-
- **Increased revenue.** Three peer-reviewed studies and five of the 12 stakeholders representing pharmacy organizations and selected pharmacies reported that, to the extent that medication synchronization can improve patients' medication adherence, it can also lead to increased pharmacy revenues generally because of an increase in filled prescriptions. For example, one of the three peer-reviewed studies reported that medication synchronization resulted in an average increase in medication adherence of almost 5 percent over the first 6 months of its use.²⁵ Similarly, an industry study found that medication synchronization leads to an additional 20 fills per patient per year, and may lead to an average of \$1,120 of additional revenue per enrolled patient annually.²⁶ The three peer-reviewed studies and the industry study did not examine the causes of the increase in prescription fills, but their authors generally attributed the increase to the improved adherence of patients using medication synchronization. Two of the three studies reported that medication synchronization can increase pharmacy revenues generally because of an increase in filled prescriptions. In addition, officials from four stakeholders representing pharmacy organizations and selected pharmacies told us that pharmacies that use medication synchronization can leverage these opportunities to speak with patients and offer additional services, such as immunizations; these services can further help increase pharmacy revenue.

Regarding health plans, some studies and stakeholders identified the following potential benefits of medication synchronization.

- **Higher Medicare quality performance scores.** Three peer-reviewed studies reported that medication synchronization can potentially improve health plans' Medicare quality performance scores.²⁷ CMS assesses the quality performance of Part D plans using information on various measures, such as adherence to medications for diabetes, high cholesterol, or hypertension.²⁸ Specifically, CMS rates the plans'

²⁵Hinson, Garofoli, and Elswick, "The Impact of Medication Synchronization," p. 236.

²⁶National Community Pharmacists Association, *Assessing the Impact of a Community Pharmacy-Based Medication Synchronization Program on Adherence Rates* (2013).

²⁷See Butler, Ruisinger, Bates, Prohaska, and Melton, "Medication Synchronization Program," p. 535; Dao, Hata, and Sarino, "Appointment-Based Medication Synchronization," p. 6; Krumme, Isaman, Stolpe, Dougherty, and Choudhry, "Medication Synchronization Programs," p. 185.

²⁸See 42 C.F.R. §§ 422.152(b)(3), 423.153(c)(5) (2018). Similar performance measures also apply to private plans.

performance using a star rating system, which gives each plan a score of between one and five stars, with five stars being the highest rating. Medication adherence measures are triple weighted in the calculation of a plan's overall rating.²⁹ Plans with the highest star ratings are rewarded with member enrollment incentives, while plans with lower star ratings are penalized. In addition, Medicare Advantage plans with high ratings may also receive financial bonuses from Medicare.³⁰ To the extent that there are improvements in beneficiaries' medication adherence as a result of medication synchronization, health plans may experience improved performance ratings and the commensurate financial benefits. However, only one of the four stakeholders representing health plan organizations and selected health plans indicated improved Medicare quality performance scores as a potential benefit of medication synchronization.

- **Reduced medical costs.** Medication synchronization may also benefit health plans by reducing their overall medical costs, according to one peer-reviewed study.³¹ The study found that medication synchronization can result in significant savings in medical costs for health plans, despite the increase in medication costs to the health plan. Specifically, the study reported that medical savings per additional dollar spent on medications under medication synchronization ranged from approximately \$1 to \$37, depending on the medication. According to the study, health plans could potentially experience such reduced medical costs as a result of medication synchronization because when patients are adherent to their medications, they may decrease their utilization of healthcare services. However, only one of the four stakeholders representing

²⁹See CMS, *Announcement of Calendar Year 2019 Medicare Advantage Capitation Rates and Medicare Advantage and Part D Payment Policies and Final Call Letter* (April 2, 2018), accessed November 9, 2018, <https://www.cms.gov/medicare/health-plans/medicareadvtspeccratestats/downloads/announcement2019.pdf>.

³⁰See 42 C.F.R. § 422.258(d)(7) (2018); CMS, *Medicare Part C & D Star Ratings: Update for 2019*, accessed November 16, 2018, <https://www.cms.gov/medicare/prescription-drug-coverage/prescriptiondrugcovgenin/downloads/2019-star-ratings-user-call-slides.pdf>. Medicare Advantage plans provide health benefits to beneficiaries through private health plans.

³¹Julie A. Patterson, David A. Holdford, and Kunal Saxena, "Cost-Benefit of Appointment-Based Medication Synchronization in Community Pharmacies," *American Journal of Managed Care*, vol. 22, no. 9 (2016): pp. 587-593.

health plan organizations and selected health plans cited this as a potential benefit.

Studies and Stakeholders also Identified Potential Limitations of Medication Synchronization for Patients, Pharmacies, and Health Plans

A small number of studies and several stakeholders indicated that there are some potential limitations associated with medication synchronization. For example,

- **Patients.** One peer-reviewed study indicated that medication synchronization may not be beneficial for all patients.³² Similarly, 14 of the 15 stakeholders representing patient and pharmacy organizations and selected pharmacies said that not every patient may want to use medication synchronization. For example, 12 of the 14 stakeholders said that some patients may not be able to afford paying all copayments for their medications at one time each month, which deters them from using medication synchronization.³³ In addition, one stakeholder said that some patients prefer going to the pharmacy regularly or consider trips to the pharmacy as opportunities for social interaction and may not be interested in medication synchronization.
- **Pharmacies.** One peer-reviewed study reported that using medication synchronization is time- and labor-intensive for pharmacies. Specifically, the study reported that almost 60 percent of pharmacists surveyed indicated that implementing medication synchronization involves a significant change in a pharmacy's workflow.³⁴ Seven of 12 stakeholders representing pharmacy organizations and selected pharmacies said this was because of several challenges. For example, it may be complicated to set up the initial synchronization, determine the best anchor medication and synchronization date, or adjust patients' medication synchronization because of changes in their medical needs or therapy. In addition, pharmacists may have to conduct extensive follow-up with health plans because health plans may not be consistent in how they process pharmacies' claims that

³²Chelsea P. Renfro, Michael Patti, Jordan M. Ballou, and Stefanie P. Ferreri, "Development of a Medication Synchronization Common Language for Community Pharmacies," *Journal of American Pharmacists Association*, vol. 58, no. 5 (2018): pp. 515-521.

³³Officials from four selected pharmacies that reported using medication synchronization told us that pharmacies may try to ease this financial burden by providing patients with options, such as offering more than one medication synchronization date so that patients can spread out their copayments.

³⁴Matthew Witry and Thao Hoang, "Community Pharmacist Attitudes on Medication Synchronization Programs," *INNOVATIONS in Pharmacy*, vol. 8, no. 2 (2017): pp. 1-7.

involve short fills. For example, private health plans may initially deny coverage of short fills; such denials may require the pharmacist to expend additional resources to follow-up with the health plan to obtain approval for the short fill.

- **Health plans.** Officials from the two selected health plans told us that they do not require their Part D network pharmacies to use medication synchronization, nor do they compensate pharmacies for providing these services. While all stakeholders representing health plan organizations and selected health plans said that they view medication synchronization as having the potential to improve patients' medication adherence and health outcomes, two of these stakeholders noted the lack of data explicitly tying medication synchronization to improved patient medication adherence, medical outcomes, and overall medical costs.³⁵

A CMS Regulation and Laws in Selected States May Support the Use of Medication Synchronization, Such as By Reducing Patient Cost Sharing

Our review shows that a CMS regulation and laws related to prescription drug coverage in five selected states may support the use of medication synchronization. For example, CMS and the five selected states allow for reduced patient cost sharing for short fills needed to synchronize their medications.

CMS

CMS does not have a formal medication synchronization program or policy for Medicare; however, a CMS regulation related to prescription drug benefits may support medication synchronization by reducing beneficiary cost sharing for certain amounts dispensed, according to officials. Specifically, CMS issued a regulation that, starting in 2014, required Medicare Part D plans to establish a daily cost-sharing rate (for example, a prorated copayment) when a beneficiary receives less than a month's supply of a prescription medication—generally referred to as a

³⁵Officials from one health plan added that they consider medication synchronization as one of different methods pharmacies can use to improve patient adherence. For example, other methods can include reminder phone calls; drug reminder packaging, such as weekly pillboxes; automatic refills; and patient education.

short fill.³⁶ According to CMS, the primary goal of the regulation was to reduce medication cost and waste—such as by allowing beneficiaries to initially receive a short fill of a new medication so that they can assess, in consultation with their providers, the efficacy of the medication and any associated adverse side effects.³⁷

Because short fills may be needed to initially synchronize multiple medications to the same refill date, the prorated copayment may reduce the financial burden on beneficiaries who require these fills, according to CMS officials. In addition, officials from a selected pharmacy and officials from a technology vendor added that from a value perspective, beneficiaries may be reluctant to enroll in medication synchronization if they had to pay a full copayment for less than a month's supply of medication. For example, as illustrated in figure 2, to initiate medication synchronization for a beneficiary taking three medications, each with a different refill date, the pharmacist may dispense short fills for two of the three medications. In this case, the pharmacist may dispense 8 days' supply of one medication and 3 days' supply of another medication. Prior to the regulation, the beneficiary would have paid \$45 in copayments for these two short fills, as compared to \$7 with prorated copayments—a difference of \$38.³⁸

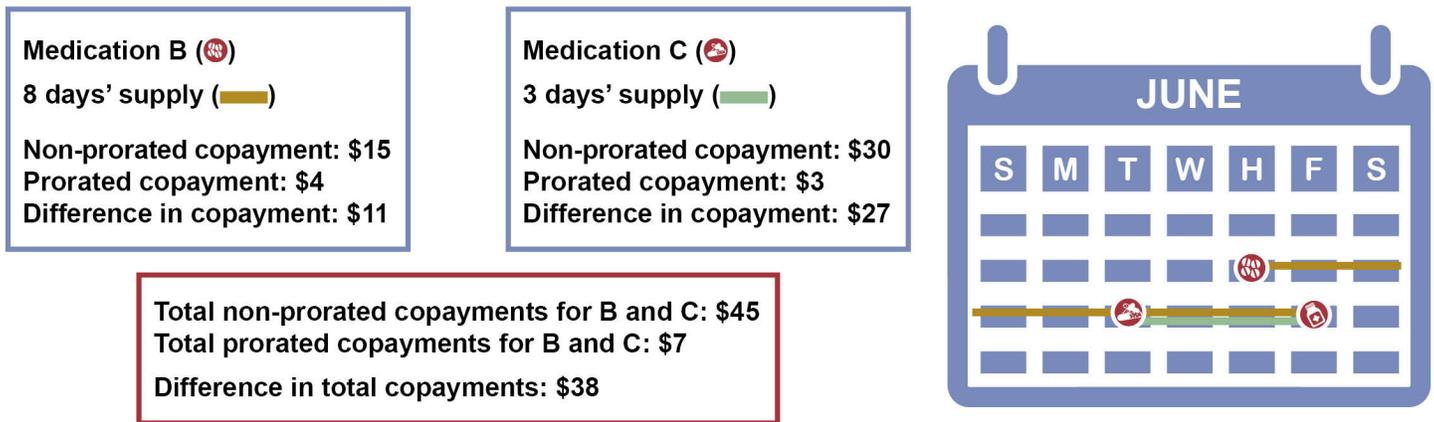
³⁶See 77 Fed. Reg. 22072, 22076, 22126, 22169 (Apr. 12, 2012) (preamble II.D.6) (pertinent provision codified as amended at 42 C.F.R. § 423.153(b)(4)(2018)). The regulation pertains to the dispensing of prescriptions for less than an approved month's supply for medications covered under Part D, with certain exceptions such as antibiotics.

³⁷For example, if the medication were prescribed for a 10-day trial period, the beneficiary and health plan would have avoided the cost and waste associated with the unused quantity that would have been prescribed under current standard practices (likely, the remaining 20-day supply if a full 30-day supply was dispensed). In the preamble of the final rule, CMS stated that facilitating medication synchronization is an additional benefit of the regulation.

³⁸Copayment amounts can vary depending on the tier in which a medication is placed. Prescription drug plans can establish drug tiers based on the amount of beneficiary copayment required, with most generic medications placed in a low cost tier and brand name medications placed in a higher cost tier. In 2019, the maximum allowable copayment is \$20 for a Generic Tier medication and \$47 for a Brand Tier medication. See CMS, *Announcement of Calendar Year 2019 Medicare Advantage Capitation Rates and Medicare Advantage and Part D Payment Policies and Final Call Letter*, accessed November 9, 2018, <https://www.cms.gov/medicare/health-plans/medicareadvtspecratestats/downloads/announcement2019.pdf>. For the purpose of this analysis, we used \$15 as the copayment for a generic medication and \$30 as the copayment for a brand medication.

Figure 2: Example of Copayment Costs for a Medicare Beneficiary Using Medication Synchronization With and Without Proration

To synchronize a beneficiary’s medications to Medication A (ⓐ), a pharmacist may dispense two short fills for less than a month’s supply:



Source: GAO analysis. | GAO-19-520

Notes: A copayment is usually a fixed dollar amount paid by beneficiaries for a medication. Copayment amounts can vary, for example, depending on whether the medication is generic or brand. In 2019, the maximum allowable copayment is \$20 for a generic and \$47 for a brand medication. See Centers for Medicare & Medicaid Services, Announcement of Calendar Year 2019 Medicare Advantage Capitation Rates and Medicare Advantage and Part D Payment Policies and Final Call Letter (April 2, 2018), <https://www.cms.gov/medicare/health-plans/medicareadvtspecratestats/downloads/announcement2019.pdf>. For the purpose of this analysis, we used \$15 as the copayment for a generic medication and \$30 as the copayment for a brand medication.

Selected States

The five selected states—Georgia, Illinois, Maine, Texas, and Washington—enacted laws within the last 4 years that may support medication synchronization.³⁹ Specifically, these laws:

- **Require insurance coverage of short fills.** Laws in all five selected states require health plans in their state to provide coverage for medication short fills.⁴⁰ These laws may also support medication

³⁹Georgia: 2017 Ga. Laws 769 (codified at Ga. Code Ann. § 33-24-59.22 (2018)); Illinois: 2017 Ill. P.A. 100-138 (codified at 215 Ill. Comp. Stat. 5/ § 356z.26 (2018)); Maine: 2015 Me. Laws c. 93 (codified at Me. Rev. Stat. tit. 24-A, § 2769 (2018)); Texas: 2017 Tex. 85th Leg., R.S. ch. 1007 (codified at Tex. Ins. Code Ann. § 1369.451-.456 (2017)); Washington: 2015 Wash. Sess. Laws c. 213 (codified at Wash. Rev. Code § 48.43.096 (2017)). Subsequent references are to provisions as codified to state codes.

⁴⁰Ga. Code Ann. § 33-24-59.22(c); 215 Ill. Comp. Stat. 5/ § 356z.26(b); Me. Rev. Stat. tit. 24-A, § 2769, 1.B.; Tex. Ins. Code Ann. § 1369.456; Wash. Rev. Code § 48.43.096(1)(a).

synchronization by allowing health plans and pharmacies to work around certain plan policies that may impose limits on medication refills. Specifically, officials from a technology vendor told us that some health plans may impose limits on the number of refills that can be dispensed in a month. For example, if a patient is taking five medications and is limited to five refills a month, a short fill would count towards that limit and the patient may not then be able to get all of his or her medications covered by the health plan that month. Such laws allow the health plan and pharmacy to work around these quantity limits so that the patient can receive the needed short fills to synchronize all of his or her medications. Additionally, two states—Maine and Texas—specifically require their health plans to allow pharmacies to override denials related to refilling a prescription too soon. A pharmacy may receive such denials when refilling a prescription after having just filled it—for example, dispensing a short and full refill of a medication too close together. Officials from two selected pharmacies and an organization representing pharmacies told us that such laws also help to reduce the time and resources that pharmacies otherwise would have expended on addressing issues with these drug claims.

- **Require prorated cost sharing for short fills.** Like CMS's regulation, laws in all five selected states require health plans in their state to prorate a patient's cost sharing, such as a copayment, when the patient receives a short fill of a medication.⁴¹ Officials from four selected pharmacies told us such laws help reduce the financial burden on patients when they first have their medications synchronized. Without such a law, patients would have paid a full copayment for these medications, which may have discouraged or prevented some patients from enrolling in medication synchronization.
- **Prohibit prorated dispensing fees for short fills.** Laws in four of the five selected states prohibit health plans in their state from paying pharmacies a prorated dispensing fee for medication short fills.⁴² Pharmacies receive a dispensing fee from health plans for each prescription they fill to cover the pharmacies' administrative costs of preparing and dispensing a fill. The dispensing fee is in addition to the reimbursement pharmacies receive from health plans for the costs of

⁴¹Ga. Code Ann. § 33-24-59.22(b); 215 Ill. Comp. Stat. 5/ § 356z.26(c); Me. Rev. Stat. tit. 24-A, § 2769, 1.A.; Tex. Ins. Code Ann. § 1369.454; Wash. Rev. Code § 48.43.096(1)(b).

⁴²Ga. Code Ann. § 33-24-59.22(d); 215 Ill. Comp. Stat. 5/ § 356z.26(c); Me. Rev. Stat. tit. 24-A, § 2769, 1.C.; Tex. Ins. Code Ann. § 1369.455.

the medications. In states without this law, health plans may prorate the dispensing fee for short fills—that is, pay a lower fee because a smaller quantity of medications (for example, 10 pills rather than 30 pills) is dispensed. Officials from a technology vendor and an organization representing pharmacies told us that ensuring that a health plan pays a full dispensing fee provides an incentive for pharmacies to use medication synchronization. They explained that a pharmacy’s administrative costs of dispensing a medication remains the same, regardless of the quantity dispensed.

- **Require medication synchronization process or policy.** Laws in two of the five selected states—Texas and Washington—require health plans in their state to establish a process or policy for providing medication synchronization services.⁴³ Both states require that, as part of this process or policy, the pharmacist or prescribing physician must ensure that medication synchronization is appropriate or in the best interest of the patient before the process is used. In addition to approval from both the pharmacist and physician, Texas also requires that the health plan and patient approve the medication synchronization plan. Officials from an organization representing pharmacies said that involving all these entities further helps to ensure the appropriateness of medication synchronization for a particular patient.

While stakeholders generally told us that these laws have helped to support medication synchronization, they also said that the absence of such laws has not prevented pharmacies from using it in other states. For example, the five selected pharmacies that reported using medication synchronization—including three pharmacy chains—offered these services in at least some states without such laws. Additionally, officials from a selected pharmacy told us that they continue to offer medication synchronization despite receiving a prorated dispensing fee for short fills.

Agency Comments

⁴³Tex. Ins. Code Ann. § 1369.456(b); Wash. Rev. Code § 48.43.096(1), (2).

We provided a draft of this report to the Department of Health and Human Services (HHS). HHS provided technical comments, which we incorporated as appropriate.

We are sending copies of this report to the appropriate congressional committees, the Secretary of HHS, and other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-7114 or CosgroveJ@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix II.

A handwritten signature in black ink, appearing to read 'James Cosgrove', with a large, stylized flourish at the end.

James Cosgrove
Director, Health Care

List of Committees

The Honorable Charles E. Grassley
Chairman
The Honorable Ron Wyden
Ranking Member
Committee on Finance
United States Senate

The Honorable Frank Pallone, Jr.
Chairman
The Honorable Greg Walden
Ranking Member
Committee on Energy and Commerce
House of Representatives

The Honorable Richard E. Neal
Chairman
The Honorable Kevin Brady
Ranking Member
Committee on Ways and Means
House of Representatives

Appendix I: Information about Stakeholders Interviewed

Table 1: Information about Stakeholders Interviewed

Stakeholder type	Number of organizations interviewed	Stakeholder information
Organizations that represent various entities	14	We interviewed organizations reflecting a range in interests: <ul style="list-style-type: none"> • Six organizations representing pharmacies or pharmacists • Three organizations representing patients • Two organizations representing health plans • One organization representing the pharmaceutical industry • Two state level organizations
Organization that works on Medicare policy issues	1	We interviewed one organization that specializes in Medicare issues and conducts analysis related to access to and quality of care, among other things.
Selected pharmacies that use medication synchronization	5	We interviewed selected pharmacies that reported using medication synchronization representing: <ul style="list-style-type: none"> • Two large national retail chains • One mid-size regional retail chain • One small independent, single-store, retail pharmacy • One mail order pharmacy
Selected pharmacy that does not use medication synchronization	1	We interviewed a selected large national retail chain pharmacy that reported not using medication synchronization.
Selected Medicare plans that offer prescription drug coverage	2	We interviewed two selected Medicare health plans that offer prescription drug coverage (Part D) that are among the top five Part D plans covering the largest Medicare populations—the combined Medicare Part D enrollment in these two plans totaled almost 14 million—or 31 percent of all Part D beneficiaries, as of August 2018.
Selected medication synchronization technology vendors	2	We interviewed two selected medication synchronization vendors that contract with pharmacies to provide technological support in performing tasks such as identifying patients who would benefit from medication synchronization; determining the anchor medication; and setting up automated reminder to patients, in advance of their prescription refills. We identified these vendors in peer-reviewed studies on medication synchronization or through interviews with stakeholders.
Experts who worked on issues related to medication synchronization	5	We interviewed experts in medication synchronization, identified in peer-reviewed studies on medication synchronization or through interviews with stakeholders.
Total	30	

Source: GAO. | GAO-19-520

Appendix II: GAO Contact and Staff Acknowledgments

GAO Contact

James Cosgrove at (202) 512-7114 or CosgroveJ@gao.gov

Staff Acknowledgments

In addition to the contact named above, Tim Bushfield, Assistant Director; Pauline Adams, Analyst-in-Charge; George Bogart; Nina Daoud; Krister Friday; Melissa Trinh-Duong Ostergard; and Vikki Porter made key contributions to this report.

Bibliography

Andrews, S. B., T. R. Marcy, B. Osborn, and L. G. Planas. "The Impact of an Appointment-Based Medication Synchronization Programme on Chronic Medication Adherence in an Adult Community Pharmacy Population." *Journal of Clinical Pharmacy and Therapeutics*, vol. 42, no. 4 (2017): pp. 461-466.

Barnes, Brenda, Ana L. Hincapie, Heidi Luder, James Kirby, Stacey Frede, and Pamela C. Heaton. "Appointment-Based Models: A Comparison of Three Model Designs in a Large Chain Community Pharmacy Setting." *Journal of the American Pharmacists Association*, vol. 58, no. 2 (2018): pp. 156-162.

Butler, Kendra T., Janelle F. Ruisinger, Jessica Bates, Emily S. Prohaska, and Brittany L. Melton. "Participant Satisfaction with a Community-Based Medication Synchronization Program." *Journal of the American Pharmacists Association*, vol. 55, no. 5 (2015): pp. 534-539.

Dao, Nancy, Sun Lee, Micah Hata, and Lord Sarino. "Impact of Appointment-Based Medication Synchronization on Proportion of Days Covered for Chronic Medications." *Pharmacy*, vol. 6, no. 2 (2018): pp. 1-9.

DiDonato, Kristen L., Kristin R. Vetter, Yifei Liu, Justin R. May, and D. Matthew Hartwig. "Examining the Effect of a Medication Synchronization or an Education Program on Health Outcomes of Hypertensive Patients in a Community Pharmacy Setting." *INNOVATIONS in Pharmacy*, vol. 5, no. 3 (2014): pp. 1-9.

Doshi, Jalpa A., Raymond Lim, Pengxiang Li, Peinie P. Young, Victor F. Lawnicki, Joseph J. State, Andrea B. Troxel, and Kevin G. Volpp. "A Synchronized Prescription Refill Program Improved Medication Adherence." *Health Affairs*, vol. 35, no. 8 (2016): pp. 1504-1512.

Doshi, Jalpa A., Raymond Lim, Pengxiang Li, Peinie P. Young, Victor F. Lawnicki, Andrea B. Troxel, and Kevin G. Volpp. "Synchronized Prescription Refills and Medication Adherence: A Retrospective Claims Analysis." *American Journal of Managed Care*, vol. 23, no. 2 (2017): pp. 98-104.

Ghassemi, Emily, Jennifer Smith, Laura Owens, Charles Herring, and Melissa Holland. "Relationship Between Medication Synchronization and Antiretroviral Adherence." *Journal of the American Pharmacists Association*, vol. 58, no. 4 (2018): pp. S78-S82.

Girdish, Charmaine, William Shrank, Sarah Freytag, David Chen, Doug Gebhard, Andrew Bunton, Niteesh Choudhry, and Jennifer Polinski. "The Impact of a Retail Prescription Synchronization Program on Medication Adherence." *Journal of the American Pharmacists Association*, vol. 57, no. 5 (2017): pp. 579-584.

Hinson, Jessica L., Gretchen K. Garofoli, and Betsy M. Elswick. "The Impact of Medication Synchronization on Quality Care Criteria in an Independent Community Pharmacy." *Journal of the American Pharmacists Association*, vol. 57, no. 2 (2017): pp. 236-240.

Holdford, David A., and Timothy J. Inocencio. "Adherence and Persistence Associated with an Appointment-Based Medication Synchronization Program." *Journal of the American Pharmacists Association*, vol. 53, no. 6 (2013): pp. 576-583.

Holdford, David, and Kunal Saxena. "Impact of Appointment-Based Medication Synchronization on Existing Users of Chronic Medications." *Journal of Managed Care & Specialty Pharmacy*, vol. 21, no. 8 (2015): pp. 662-669.

Krumme, Alexis A., Robert J. Glynn, Sebastian Schneeweiss, Joshua J. Gagne, J. Samantha Dougherty, Gregory Brill, and Niteesh K. Choudhry. "Medication Synchronization Programs Improve Adherence to Cardiovascular Medications and Health Care Use." *Health Affairs*, vol. 37, no. 1 (2018): pp. 125-133.

Krumme, Alexis A., Danielle L. Isaman, Samuel F. Stolpe, J. Samantha Dougherty, and Niteesh K. Choudhry. "Prevalence, Effectiveness, and Characteristics of Pharmacy-Based Medication Synchronization Programs." *American Journal of Managed Care*, vol. 22, no. 3 (2016): pp. 179-186.

Luder, Heidi R., Natalie Kunze, Pamela C. Heaton, and Stacey M. Frede. "An Appointment-Based Model to Systematically Assess and Administer Vaccinations." *Journal of the American Pharmacists Association*, vol. 58, no. 3 (2018): pp. 290-295.

Nguyen, E., and D. M. Sobieraj. "The Impact of Appointment-Based Medication Synchronization on Medication Taking Behaviour and Health Outcomes: A Systematic Review." *Journal of Clinical Pharmacy and Therapeutics*, vol. 42, no. 4 (2017): pp. 404-413.

Patterson, Julie, and David Holdford. "Understanding the Dissemination of Appointment-Based Synchronization Models Using the CFIR Framework." *Research in Social and Administrative Pharmacy*, vol. 13, no. 5 (2017): pp. 914-921.

Patterson, Julie A., David A. Holdford, and Kunal Saxena. "Cost-Benefit of Appointment-Based Medication Synchronization in Community Pharmacies." *American Journal of Managed Care*, vol. 22, no. 9 (2016): pp. 587-593.

Renfro, Chelsea P., Michael Patti, Jordan M. Ballou, and Stefanie P. Ferreri. "Development of a Medication Synchronization Common Language for Community Pharmacies." *Journal of the American Pharmacists Association*, vol. 58, no. 5 (2018): pp. 515-521.

Ross, Alexander, Humaira Jami, Heather A. Young, and Richard Katz. "Sync and Swim: The Impact of Medication Consolidation on Adherence in Medicaid Patients." *Journal of Primary Care & Community Health*, vol. 4, no. 4 (2013): pp. 240-244.

White, Nicole D. "Pharmacy Medication Synchronization Service Works to Improve Medication Adherence." *American Journal of Lifestyle Medicine*, vol. 10, no. 6 (2016): pp. 385-387.

Witry, Matthew, and Thao Hoang. "Community Pharmacist Attitudes on Medication Synchronization Programs." *INNOVATIONS in Pharmacy*, vol. 8, no. 2 (2017): pp. 1-7.

GAO's Mission

The Government Accountability Office, the audit, evaluation, and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through GAO's website (<https://www.gao.gov>). Each weekday afternoon, GAO posts on its website newly released reports, testimony, and correspondence. To have GAO e-mail you a list of newly posted products, go to <https://www.gao.gov> and select "E-mail Updates."

Order by Phone

The price of each GAO publication reflects GAO's actual cost of production and distribution and depends on the number of pages in the publication and whether the publication is printed in color or black and white. Pricing and ordering information is posted on GAO's website, <https://www.gao.gov/ordering.htm>.

Place orders by calling (202) 512-6000, toll free (866) 801-7077, or TDD (202) 512-2537.

Orders may be paid for using American Express, Discover Card, MasterCard, Visa, check, or money order. Call for additional information.

Connect with GAO

Connect with GAO on [Facebook](#), [Flickr](#), [Twitter](#), and [YouTube](#).
Subscribe to our [RSS Feeds](#) or [E-mail Updates](#). Listen to our [Podcasts](#).
Visit GAO on the web at <https://www.gao.gov>.

To Report Fraud, Waste, and Abuse in Federal Programs

Contact FraudNet:

Website: <https://www.gao.gov/fraudnet/fraudnet.htm>

Automated answering system: (800) 424-5454 or (202) 512-7700

Congressional Relations

Orice Williams Brown, Managing Director, WilliamsO@gao.gov, (202) 512-4400, U.S. Government Accountability Office, 441 G Street NW, Room 7125, Washington, DC 20548

Public Affairs

Chuck Young, Managing Director, youngc1@gao.gov, (202) 512-4800, U.S. Government Accountability Office, 441 G Street NW, Room 7149, Washington, DC 20548

Strategic Planning and External Liaison

James-Christian Blockwood, Managing Director, spel@gao.gov, (202) 512-4707, U.S. Government Accountability Office, 441 G Street NW, Room 7814, Washington, DC 20548



Please Print on Recycled Paper.