ePrescribing Information to
Improve Medication Adherence

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Executive Summary

Medication adherence, defined as patients taking their medications at the times, dosages, frequencies, and direction prescribed, is among the most costly challenges facing health care today.[1] In the United States, medication non-adherence causes approximately 125,000 deaths, at least 10% of hospitalizations, and costs between $100 and $289 billion annually. These costs stem from the fact that 20 to 30 percent of prescriptions are never filled, and approximately 50 percent of medications for chronic disease are not taken as prescribed.[2,3]

A number of patient-related and economic factors contribute to non-adherence. Improving medication adherence, and medication use more broadly, will require a partnership between patients, health care providers and payers. Currently, this partnership is hindered by a lack of robust tools to identify and monitor non-adherence.

The increase in electronic health record (EHR) adoption by physicians has spurred greater awareness of electronic tools for medication management and their potential to address some of the reasons for non-adherence. Government incentive programs require EHRs to support ePrescribing, drug utilization review and formulary validation, and medication reconciliation. EHRs must also have the capability to download medication history.

Minimum standards for formulary information and medication history exist and are in active use in EHRs; however the quality of information available can vary widely across payers and EHR systems, and medication reconciliation remains a largely manual process for the physician.

Current technology does not provide physicians with complete and accurate information to guide prescribing decisions, nor does it allow physicians to easily determine if a patient is adhering to therapy. As a result, proactive intervention regarding non-adherence between visits occurs inconsistently, if at all. While improving health information technology alone will not solve the problem of medication non-adherence, there is opportunity to begin to improve medication adherence through better monitoring and by providing better information in EHRs at the point of care.

To improve medication adherence through better prescription information in EHRs, we suggest two primary objectives:

1. **Improve the consistency, accuracy, and completeness of formulary and benefit information available at the point of prescribing.** When accurate, timely, and complete formulary and benefit information is available at the point of care, physicians and patients can work in partnership to select medications that best meet the combination of that patient's physical, financial, and lifestyle needs, thereby increasing the likelihood of patient medication adherence.

2. **Support more automated medication reconciliation and improve medication history information.** If medication reconciliation, the process of creating an accurate list of medications a patient is taking, were more automated for physicians, it could occur more frequently and use fewer practice resources. Additionally, the presence of more timely and accurate medication history information in the EHR would facilitate meaningful discussions between prescribers and patients about the medications the patient is, and is not, taking.

Meeting these objectives would establish the infrastructure to effectively monitor a patient's adherence to medication therapy via an EHR. As best practices for using medication information in the EHR emerge, monitoring will enable the care team to proactively engage with patients about their medication adherence.

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Adherence Issues and Available Technologies

Background on Medication Adherence

Various studies have shown that medication adherence is among the most costly challenges facing health care. It is estimated that over 25 percent of newly written prescriptions are never filled.[4] Once prescribed, approximately 50 percent of medications for chronic disease are not continued as prescribed, and rates of medication adherence drop after the first six months of therapy.[5] The direct cost of medication non-adherence is estimated between $100 to $289 billion annually.[6,7]

Medication adherence requires a partnership between patients, health care providers, and payers. There are a number of clinical, personal, and economic reasons for patient non-adherence. Patients may not adhere to a prescribed therapy because of the complexity of the regimen, unpleasant side effects, lack of immediate benefit, or because medications are associated with a social stigma. Other patients may forget to take their medication due to stress or other factors. Some patients may be uncomfortable asking their health care provider questions about their medications.

Economic factors also play a role in medication adherence. Patients may be non-adherent because their medication requires prior authorization, is not covered by insurance, or because they cannot afford the copay for their medications. Adherence can also be the result of a health system failure, such as the prescription being sent to the incorrect pharmacy or an electronic transmission issue.

Available Health Information Technologies

With the now prevalent use of EHRs[8] and additional health IT requirements under the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA), the industry now has the potential to address adherence issues through use of available health information technologies.

Electronic Health Records

EHRs can be used to estimate patient adherence to a medication by calculating when a medication was prescribed and a refill is likely to be needed. However, because EHRs generally do not have information about whether the initial prescription or the refills were actually received by the patient, EHR predictions of non-adherence are not timely enough to warrant follow-up by prescribers.

ePrescribing

The Merit-Based Incentive Payment System (MIPS), part of the MACRA Quality Payment Program, requires use of ePrescribing through its Advancing Care Information (ACI) category.[9] In 2017, providers must write at least one permissible prescription that is queried for a drug formulary and transmitted electronically using certified EHR technology in order to get credit for advancing care information.[10]

The use of ePrescribing has contributed to medication adherence. In a 2011 study by SureScripts (a fee-based national prescription Electronic Data Interchange [EDI] network), data showed a consistent 10 percent increase in patient first fill medication adherence for prescriptions issued via ePrescribing versus paper, phoned, and faxed prescriptions.[11]

Medication History

Medication history is a widely used ancillary feature of ePrescribing. Medication history is available for download to EHRs from pharmacy benefit managers (PBMs) via SureScripts. This service has been available for a number of years and is a required feature of meaningful use (MU) certified EHRs. SureScripts makes these data available from their participating PBM companies, as well as directly from commercial and a few Medicaid health plans. The data are predominately based upon paid claims, but have information from some pharmacies and include limited cash-paid prescriptions.

EHRs download medication history via a query based upon the appointment schedule, typically the day before an office visit. EHRs can also provide prescribers with an "on demand" query for medication history. Medication history is stored in the patient's medication list in the EHR. In some cases downloaded history is merged with the local medication list; in other cases the lists are separately maintained. More information about the benefits and challenges of medication history information received through ePrescribing is provided in the "Standards" section of this white paper.

Medication Reconciliation

CMS defines "medication reconciliation" as the process of identifying the most accurate list of all medications that the patient is taking, including name, dosage, frequency, and route, by comparing the medical record to an external list of medications obtained from a patient, hospital, or other provider.[12] Medication reconciliation is required by MU at points of "transitions of care," which CMS defines as the movement of a patient from one setting of care (eg, hospital, ambulatory primary care practice, ambulatory specialty care practice, long-term care, home health, rehabilitation facility) to another.[12]

EHR vendors have created workflows to accommodate medication reconciliation within the patient visit process. In general, these workflows are manually driven, often by displaying side-by-side lists of local medications and downloaded medications, allowing prescribers to reconcile downloaded items with local medications. Some EHRs have automated the reconciliation process to some extent; however, there is still a manual "final approval" process. In addition, physicians may complete medication reconciliation by comparing a list of prescribed medications to the list of medications that the patient reports that he or she is taking. Physicians typically check a box in the EHR to indicate that they have completed medication reconciliation for the purpose of reporting MU.

Medication Fill Status

Medication fill status, or "RxFill" data, refers to an EDI transaction that is generated by the pharmacy and sent to the prescriber each time there is an updated fill status (eg, when a prescription is dispensed). Fill status differs from medication history data in that a fill status notification is created unsolicited, each time a drug is dispensed. In contrast, medication history is only provided in response to a query from the EHR and contains a summary of all medications paid for by a patient's insurance.

RxFill is not widely adopted by retail pharmacies, or by EHR vendors. Factors influencing this lack of adoption are discussed in detail in the "Standards and Challenges" section of this white paper.
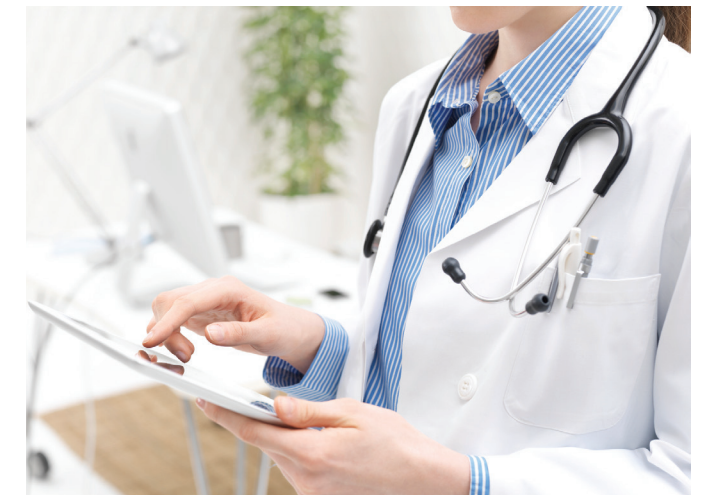
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Standards and Challenges to Improving Adherence Using HIT

Technology exists today that could be extended and enhanced to enable automation in an EHR to provide significantly more medication data in the EHR. Coupling these data with analytics and outreach would make medication adherence monitoring practical and cost-effective.

However, few providers currently proactively monitor patient adherence. As a result, advanced health information technology (HIT) features to monitor adherence do not exist in most EHRs. This means that for providers interested in monitoring adherence, simply reviewing the data in the EHR can create substantial additional work.

Most EHRs offer a basic set of features to meet the need for electronic information about a patient's medications; however, more work is needed for HIT to reach its full potential as a tool to monitor and address the problem of medication non-adherence. Standards for the representation of prescription data, such as RxNorm, and for its transmission, such as NCPDP SCRIPT, hold the key to more automated medication monitoring. These standards are described below.

RxNorm

RxNorm is a non-proprietary drug vocabulary maintained and distributed by the National Library of Medicine as part of the Unified Medical Language System®. RxNorm provides normalized names for drugs and is designed to provide links between other commonly used proprietary drug information sources like compendia vendors First Databank, MediSpan, Gold Standard, and Multum. By providing these links, RxNorm could facilitate communication of drug names between different systems, and help with reconciling the ePrescribing information sent by the prescriber with the medication history information received from the PBM.

Adoption of RxNorm has been slow as a result of perceived shortcomings of the data. Identifying any remaining gaps or shortcomings and educating the users on what RxNorm

does and does not do is the biggest remaining challenge to widespread adoption. Support of RxNorm has been mandated as part of MU, but EHR systems typically utilize one of the proprietary drug information sources and meet the MU requirement using cross referencing.

NCPDP Standards

The nationally recognized standard for ePrescribing, SCRIPT, is maintained by the National Council for Prescription Drug Programs (NCPDP). NCPDP SCRIPT is a CMS-endorsed standard, and is required to be utilized by ePrescribing vendors and prescribers for MU, as well as by health plans and PBMs as a requirement of participation for Medicare Part D.

NCPDP SCRIPT also establishes standards for the transaction of ePrescribing and medication-related data. NCPDP's formulary and benefit, medication history, and fill status standards have particular relevance to medication adherence, and are described in detail below.

Formulary and Benefit Data

In an EHR or ePrescribing system, formulary and benefit data are used to enable formulary validation at the point of prescribing. This information is made available through a formulary and benefit standard that was created by NCPDP almost a decade ago. As with most standards, formulary and benefit enables maximum flexibility to accommodate the many different needs for producers of the data.

Most large EHRs have included capabilities, certified by SureScripts, to display formulary tier levels, copay amounts, alternatives for mail order, prior authorization, and step therapy requirements. Many plans do not provide the detailed formulary information that is needed to support these more robust features of formulary and benefit data. As a result, availability of the data varies considerably from one payer to another.

An emerging tool is the real-time benefit inquiry (RTBI), whose value lies in its potential for providing real-time, patient-specific formulary and benefit information at the point of care. Early pilots using a modified NCPDP standard have shown that prescriber behavior changes when the RTBI reveals that a drug isn't covered by a patient's insurance.

Medication History

Use of the NCPDP SCRIPT medication history segment is required for providers seeking to demonstrate MU and for plans participating in Medicare Part D, so it is broadly used. The medication history Request transaction is defined by NCPDP as a "Request from an entity to an entity requesting a list of medications that have been prescribed, dispensed, claimed or indicated (OTCs) by patient." This transaction is used by the health care provider to request medication history from the PBM.

The medication history Response transaction is used to respond to the query with a patient's medication history. This transaction is defined by NCPDP as a "Response from an entity to an entity to describe the patient's medication history, including the medications that were dispensed or obtained within a certain timeframe, optionally including the physician that prescribed it." An RxHistoryRequest can be responded to with either RxHistoryResponse, a Status, or an Error. Figure 1 depicts the data flow of the medication history eligibility request and response.

Figure 1: Flow of medication history
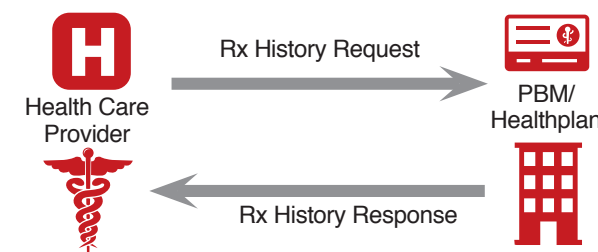
The medication history transaction could be leveraged for purposes of medication monitoring. There are a number of advantages and disadvantages to this strategy.

ADVANTAGES – MEDICATION HISTORY
1. **Medication history is free to the physician.** The electronic transaction cost to provide medication history is borne by the participating health plans and PBMs; therefore, there is no cost to ambulatory physicians.
2. **Medication history is relatively comprehensive.** The largest PBMs and health plans participate with SureScripts, which means that a high percentage of insured patients' medication history data is available for query using medication history.

3. **Medication history shows all prescriptions for patients paid by the insurer.** Medication history data are based upon claims data available for all prescriptions for insured patients, regardless of the prescriber or where the prescription was filled.

DISADVANTAGES – MEDICATION HISTORY
1. **Medication history data are not available for all payers or for self-paid prescriptions.** The medication history data available today are based upon SureScripts-participating PBM and health plan claims data. While all of the major plans are connected to SureScripts, not every PBM and health plan participates. There is sparse participation by Medicaid plans. In addition, history data typically only includes prescriptions for which a claim is processed. Therefore most prescriptions paid for with cash, or for which claims are not processed, are not included in medication history data.
2. **Workflow is not suitable for proactive monitoring.** Generally, EHRs are only programmed to request medication history information in advance of a scheduled visit, in most cases based upon the next day's appointment schedule. This means that the medication history information in EHRs cannot be used to proactively monitor a patient's adherence unless the patient is scheduled to visit.
3. **The medication reconciliation process is labor intensive.** Reconciliation between "local" medication history (the prescriptions written by the health care provider) and the "downloaded" medication history (based upon claims data from the PBM) is a manual process because product identifiers aren't standardized. Drugs are identified by NDC code* in the claims data, and ePrescribing systems use drug compendia from commercial vendors or RxNorm.
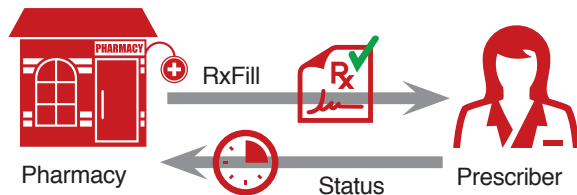
RxFill
The NCPDP SCRIPT standard also supports the exchange of prescription "fill" status. This transaction is sent to the prescriber from the pharmacy and indicates the status of the dispensing (dispensed, partially dispensed, not dispensed) on new and refill prescriptions. Use of this segment is not required for MU and Medicare D participants.

The RxFill transaction is originated by the pharmacy and can be used in three cases:
1. to notify of a dispensed prescription (the patient picked up the medication),
2. to notify of a partially dispensed prescription (patient picked up part of the medication), and
3. to notify of a prescription never dispensed (patient did not pick up the medication).

* NDC code identifies the specific product dispensed at the pharmacy, which is based on information such as the manufacturer and original package size. For multi-source medications, a single prescription (eg, 600 mg of ibuprofen) could have tens or even hundreds of possible NDCs.

Figure 2 depicts the data flow of the RxFill data between pharmacy and prescriber. The RxFill transaction has potential to be leveraged for purposes of medication adherence monitoring. There are a number of advantages and disadvantages of this strategy.

Figure 2: Flow of RxFill data

ADVANTAGES – RxFILL

1. **Use of RxFill closes the loop between the pharmacy and the prescriber.** The RxFill transaction is pushed out by the pharmacy each time a prescription is dispensed, both initially and at each refill. RxFill information is also sent to the prescriber in real time, eliminating the need to initiate a query to access this information outside of a scheduled appointment. Use of this transaction could enable prescribers to monitor patient adherence by providing actual fill data to compare with the patient's care plan.

2. **RxFill data encompass all payers, including self-pay patients.** RxFill data are pushed out by the pharmacy to the prescriber for all prescriptions, therefore, data are available for patients who do not have insurance coverage or are paying cash.

3. **RxFill data show what was actually dispensed to the patient.** In some cases, a verbal change order or pharmacy substitution will result in the patient receiving a different medication from what was originally prescribed. The RxFill transaction can by used to inform providers of such changes and update the record in the EHR.

DISADVANTAGES – RxFILL

1. **Few pharmacies and EHRs support RxFill.** As a result of limited demand from health care providers, few pharmacies and EHRs have programmed to support the transaction. Adding RxFill data to workflows designed for visit-centric medication reconciliation may exacerbate an already burdensome manual reconciliation process.

2. **There is no consensus on who should bear the cost of RxFill transactions.** There will be a cost from the EDI network to the participants for the transmission of the RxFill data. The value proposition is unclear for health plans and PBMs, who currently underwrite the cost of medication history, and there is no evidence that health care providers will tolerate fees for RxFill data.

3. **RxFill data are provider specific.** RxFill only transmits fill status related to a single provider's prescribing activity. It does not transmit information related to medications prescribed to a patient by other health care providers. Therefore, RxFill does not give a complete picture of a patient's medications.

Recommendations

Policies to improve medication adherence using HIT must leverage existing standards to improve the quality of prescription information available within EHRs, thereby forging greater partnerships between payers, health care providers, and patients. To improve medication adherence through better medication information in EHRs, we suggest two primary objectives:

1. Improve the consistency, accuracy, and completeness of formulary and benefit information available at the point of prescribing. When patient-specific, timely, and complete formulary and benefit information is available at the point of care, physicians and patients can work in partnership to select medications that meet the combination of patients' physical, financial, and lifestyle needs, thereby increasing the likelihood that patients remain adherent to their medication regimens. Policies to address formulary and benefit information could include:
- Establishing consistent standards for formulary information provided to ambulatory EHRs, to include available medications and patient cost-sharing information

- Researching best practices for the effective display of formulary information

2. Support more automated medication reconciliation and improve medication history information. If medication reconciliation became a more automated process for the physician, medication reconciliation could occur more frequently and free up practice resources. More timely and accurate medication history information would facilitate meaningful interactions between prescribers and patients about the patient's medication adherence. Policies to improve medication history information could include:
- Accelerating use of RxNorm to enable automated medication reconciliation
- Enabling EHRs to easily link written and filled prescriptions by carrying prescription serial numbers through on claims and in dispensing systems
- Studying better ways to evaluate adherence based on the information available to prescribers in EHRs

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